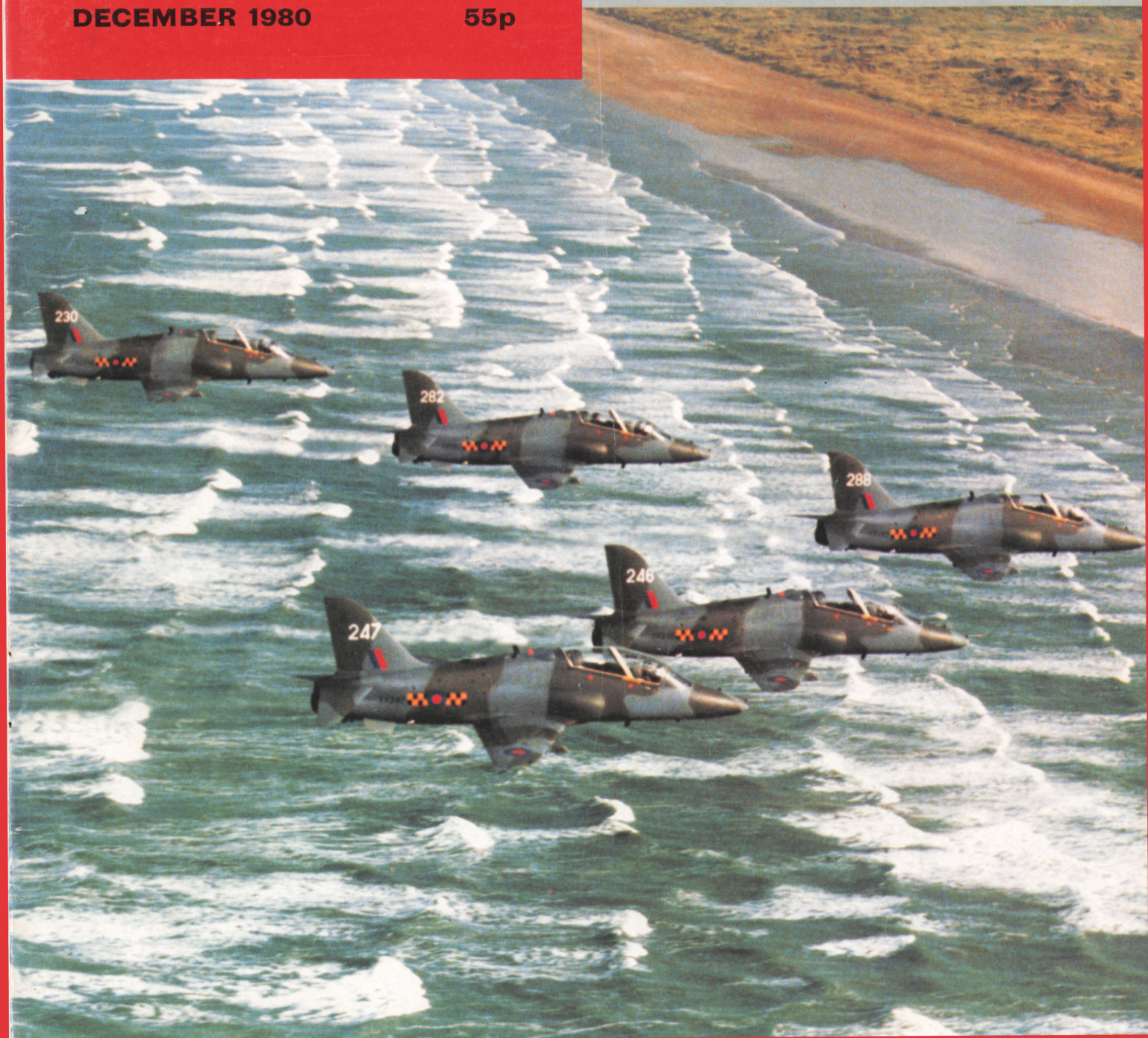
AIR pictorial

DECEMBER 1980 55p

Travels in Southern France

Exercise "Crusader"



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VOLUME 42 No. 12 DECEMBER 1980

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COVER: Five British Aerospace Hawk T.1s of the R.A.F.'s No. 2 Tactical Weapons Unit sweep low over the Devonshire coastline on their way home to Chivenor. Fuselage markings denote No. 63 "Shadow" Squadron (Photo: Geoffrey Lee)

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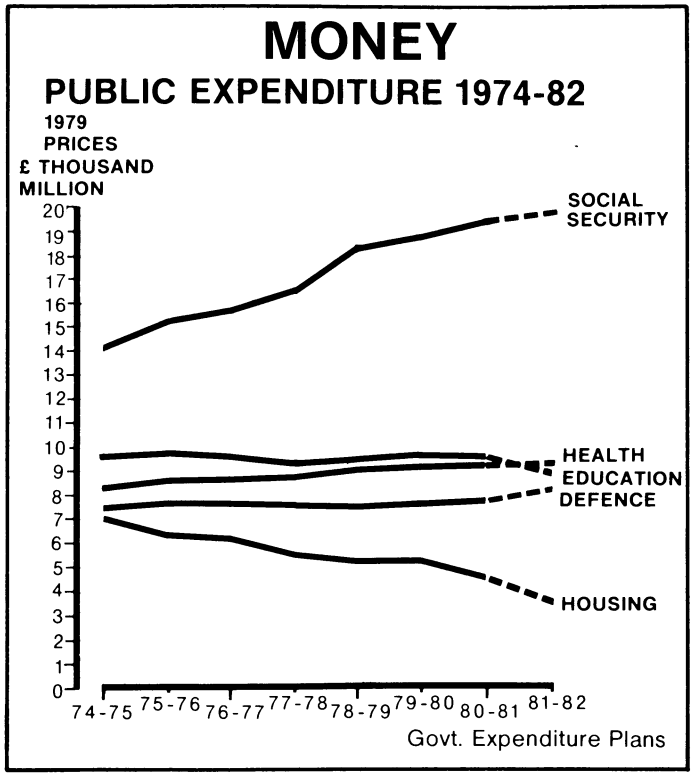
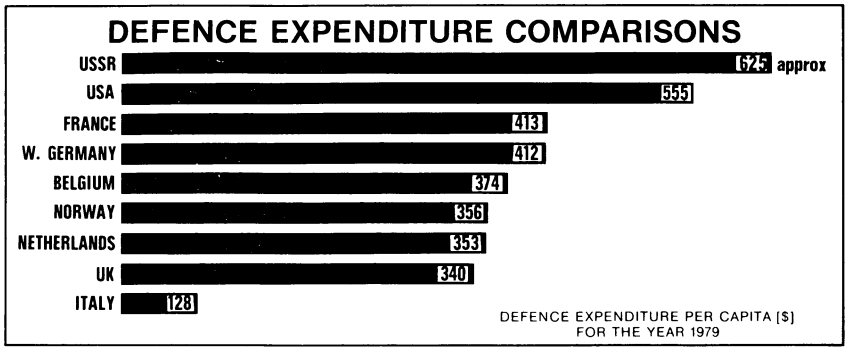
AIR pictorial

Government Cuts . . .

. . . are to be made for "economic survival". But shouldn't safety come first?





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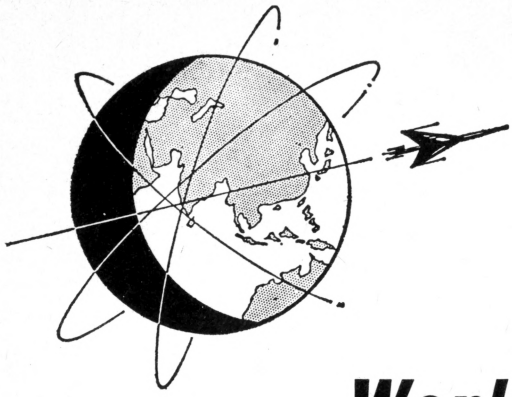
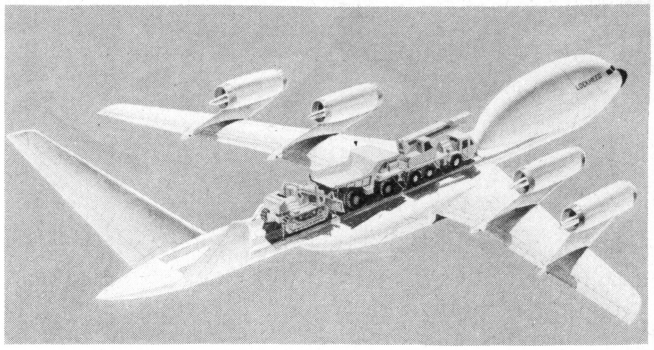




Lockheed-Georgia project for a multi-mission "flat-bed" transport designed to carry outsize loads

World Air News

New aircraft-carriers

THE U.S. NAVY is to have a fourth *Nimitz*-class nuclear-powered aircraft-carrier. A $1,200 million contract for the 95,000-ton vessel, designated CVN-71, has been placed with the Newport News Shipbuilding & Dry Dock Co., Virginia, and the ship, which will be capable of carrying ninety aircraft, is due to be delivered in 1987.

At present the U.S. Navy has thirteen carriers including three nuclear-powered vessels: *Enterprise, Nimitz* and her sister-ship *Dwight D. Eisenhower.* The third *Nimitz*-class ship, *Carl Vinson,* is due to be commissioned in 1982. Of the conventionally powered carriers, there are four *Kitty Hawk*-class, four *Forrestal*-class and two *Midway*-class, of which the oldest is *Coral Sea,* launched in 1946, and due to remain in service until 1986.

For some years the U.S. Navy has been operating below its stated "minimum" of fifteen carriers and there are plans to reactivate *Oriskany,* one of five *Essex*-class carriers still preserved in mothballs.

The French Government has approved the construction of two new 32,000-ton nuclear-powered carriers to replace *Clemenceau* and *Foch.* The first of the new ships is expected to replace *Clemenceau* in 1990–91; *Foch,* at present undergoing an extensive refit, is likely to remain in service until the end of the century.

The French Navy had previously been studying plans for smaller carriers of around 20,000 tons, but now that it has opted for larger ships it seems probable that these will embark conventional aircraft using catapults and arrester gear.

Australia is to replace her light fleet carrier H.M.A.S. *Melbourne* (ex-H.M.S. *Majestic*) with a helicopter-carrier capable of operating V/STOL aircraft. The decision was announced recently by Defence Minister Mr. Dennis Killen, who also stated that the new ship is expected to enter service in 1985.

It seems that the Italian *Giuseppe Garibaldi* design is favoured, although the R.A.N. has also been evaluating the U.S. *Iwo Jima* class and the Spanish Navy's Sea Control Ship (basically a U.S. design but with a ski-jump and now under construction at Ferrol). Choice of a V/STOL aircraft, said Mr. Killen, will be made in 1983; the only two candidates would appear to be the Sea Harrier and AV-8B.

More A300s for EgyptAir

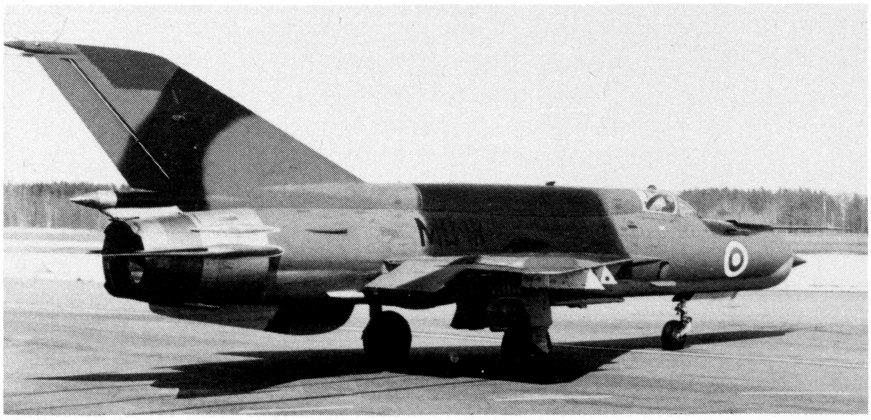
EgyptAir have converted options for two A300B4-200 Airbuses into firm orders, increasing their total to five. The new aircraft will be delivered in the third quarter of 1982.

The Egyptian flag-carrier is at present operating five A300s, three leased aircraft and its own first two, SU-BCA "Horus" and SU-BCB "Osiris" which were delivered on 26th and 30th September respectively. Sales of the A300 now total 203 and there are options on a further 77.

Lockheed's "flat-bed" transport

Lockheed-Georgia, under a NASA contract, have produced a design for a multi-mission transport capable of carrying outsize loads on its "flat-bed" fuselage without the need for the items of cargo (*e.g.,* tanks, bulldozers and cranes) to be dismantled for flight.

The flat-bed portion of the aircraft has a shallow body and is sufficiently



Top: *The first Dassault Mirage 2000B two-seat fighter/trainer (fifth prototype built) made its maiden flight at Istres on 11th October. During the flight it reached Mach 1.3 at 40,000 ft.*
Bottom: *The Finnish A.F. is now taking delivery of thirty MiG-21bis fighters (MB-111 illustrated) and two two-seat MiG-21UMs which will replace MiG-21Fs in* Hävllv. 31 *of the Karelia Wing at Kuopio-Rissala*

British Airways Cargo's first Boeing 747F freighter, G-KILO "British Trader", entered service on 11th October with trial runs between London and New York. Powered by Rolls-Royce RB.211s, it has a swing-up nose and aft side cargo door

close to the ground to facilitate loading. A hinged nose section includes the flight deck and is pressurised.

For passenger operations, a pressurised module would be rolled on to the flat-bed and attached to the flight station. For normal freighting, a lightweight glass-fibre fairing similar in shape to the passenger module would enclose the payload. Very large vehicles would be driven directly on to the flat-bed, secured and flown "in the open".

Boeing orders

Air France have ordered a Boeing 747 Combi which was delivered in October. It is the airline's 28th 747 and 91st Boeing airliner. Sales of the 747 now total 559.

Sun Land Airlines, a U.S. charter operator based at Portland, Oregon, have ordered two 737-200s for delivery in June and December 1982. Sales of the 737 now total 842.

The Transbrasil order for three Boeing 757-200s (see November issue, page 415) has now been confirmed.

TriStars for Air Portugal

Air Portugal (TAP), the Portuguese national airline, have ordered three Lockheed L-1100-500 TriStars and placed options on two more. To be delivered in 1983, they will be powered by Rolls-Royce RB.211-524 engines.

The TriStars will replace Boeing 707s and will be operated initially on routes from Lisbon to New York, Caracas, Rio de Janeiro, Johannesburg and Kinshasa. Sales of the TriStar now total 246.

Canadian A.F. "choppers"

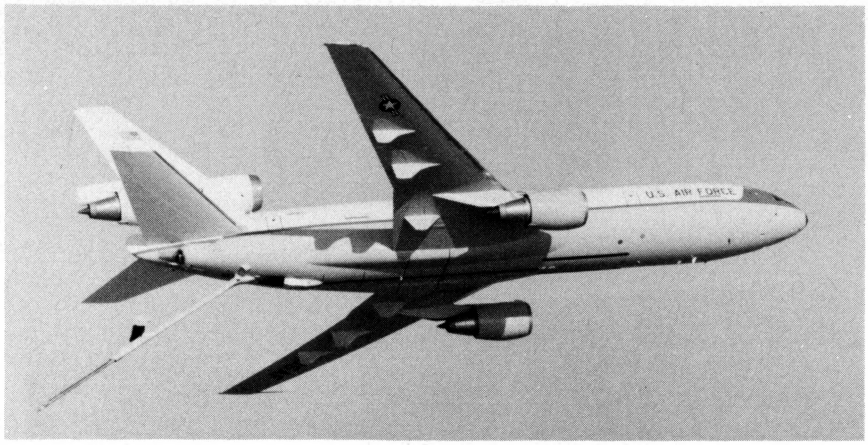
The Canadian A.F. has ordered fourteen Bell 206B JetRanger IIIs to supplement its basically similar CH-136 Kiowa helicopters, seventy-four of which were purchased. The new JetRangers will be based at Portage La Prairie, Manitoba.

Sixteen of the existing Kiowas are to replace D.H. Canada Otters in four Reserve squadrons (four aircraft each): Nos. 401 and 438 Squadrons of No. 1 Air Reserve Wing based at Montreal; and Nos. 400 and 411 Squadrons of No. 2 ARW at Toronto. The Kiowas will be used in the light transport and reconnaissance roles in support of the land forces.

R.A.F. Canberra cuts

The R.A.F. is to reduce the size of its Canberra force during the next two years. The two photo-reconnaissance squadrons at present flying Canberra PR.7s and PR.9s, Nos. 13 and 39 at Wyton, are to be disbanded by 5th

Top: *The Aérospatiale AS.332L Super Puma, F-WZJN, a new 30-in.-longer version accommodating up to twenty passengers, made its first flight at Marignane on 10th October. First customer for this variant is Petroleum Helicopters Inc. of the U.S.A.*
Bottom: *Impression of a projected stretched version of the British Aerospace HS 748 seating eighty passengers and powered by two General Electric T64 turboprops*



A McDonnell Douglas KC-10A Extender tanker/transport, temporarily registered N80KC, during tests with its refuelling boom which is 58 ft. 4 in. long, can deliver 1,500 U.S. gal./min. and is operated by a digital fly-by-wire control system

World Air News . . .

January 1982 and 5th January 1983 respectively.

No. 360 Squadron, also based at Wyton and operating seventeen Canberras in an ECM role, is to have its aircraft allocation cut; while two target facilities squadrons, No. 100 at Marham and No. 7 at St. Mawgan, are to be reduced in size and merged (final base to be decided).

These latter changes are to be made before the end of 1981 and as a consequence the size of No. 231 O.C.U. at Marham will be reduced.

More KC-135s at Fairford

During October the number of U.S.A.F. Boeing KC-135 Stratotankers operating from R.A.F. Fairford, Gloucs., was increased from five to ten. This is the second step in the planned build-up to fifteen tankers by March 1981. KC-135s first arrived at Fairford in September 1979 and operate in support of U.S. commitments to NATO.

HS 748 for Air Virginia

Air Virginia, the fast-growing U.S. regional airline based at Lynchburg, Virginia, have ordered a British Aerospace HS 748 for delivery in April 1981 and placed an option on a second. The aircraft will be fitted out by Aero Spacelines at Goleta, California.

As well as serving the state of Virginia, the airline operates scheduled services to Washington D.C., Baltimore, New York and Philadelphia. Sales of the HS 748 now total 351.

World's heaviest aircraft

On 10th October Cargolux, the Luxemburg-based all-cargo airline, took delivery of the world's heaviest aircraft, a Boeing 747F freighter with a maximum gross weight of 833,000 lb. Powered by 53,000-lb. s.t. Pratt & Whitney JT9D-7Q engines, the new freighter has a 13,000 lb. higher certificated weight than any previous model.

Flying Tiger/Seaboard merger

On 1st October Flying Tiger Line and Seaboard World Airlines were merged, under the Flying Tigers banner, to form the first U.S. round-the-world all-cargo airline, spanning Europe, the U.S.A. and Asia. Hitherto Flying Tigers have operated mainly in the U.S.A. and Pacific while Seaboard's sphere has been domestic and transatlantic.

The merger, which has taken 32 months to negotiate, was approved by the U.S. Government and entailed the acquisition of Seaboard for $400 million. The combined aircraft fleet includes sixteen Boeing 747F freighters (ten Series 200s and six 100s), three passenger 747-200Bs, twenty-one McDonnell Douglas DC-8-63CF freighters and seven DC-8-61CF freighters. Between thirteen and eighteen of the DC-8-63s are to be re-engined with General Electric/SNECMA CFM 56s, becoming DC-8-73s.

During a Press conference to announce the merger, Flying Tigers stated that they were considering Stansted as an alternative to Heathrow.

Sikorsky S-76 deliveries

The Icelandic Coast Guard has taken delivery of a new Sikorsky S-76 helicopter which will be used for search and rescue and fishery protection duties. Based at Reykjavik, it will also operate from Coast Guard cutters. The S-76 has been given the registration TF-RAN to commemorate an earlier Coast Guard fixed-wing aircraft.

Briles Wing & Helicopter Inc. have taken delivery of three S-76s which they will lease to offshore oil operators. Briles own Catalina Airlines who fly Sikorsky S-58Ts between San Pedro, California, and Catalina Island and may purchase further S-76s for this route.

No. 18 Squadron to re-equip

On 16th October No. 18 Squadron and its Westland Wessex HC.2s left R.A.F. Gütersloh, West Germany—their home for the past ten years—and returned to Odiham. There it will be the first R.A.F. squadron to re-equip with Boeing-Vertol CH-47D Chinook HC.1 medium-lift helicopters.

In due course No. 18 will return to Germany but meanwhile its place at Gütersloh has been taken by No. 230 Squadron with Westland/Aérospatiale Puma HC.1s.

CL-215 back in production

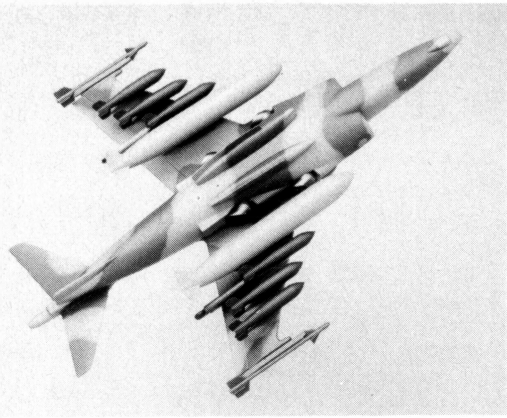
Canadair announce that their CL-215 multi-purpose amphibian, designed originally as a water-bomber for forest fire-fighting, is now in production again at their Dorval factory. Four CL-215s of the new batch are to be delivered to Yugoslavia in the last quarter of 1981.

Sixty-five CL-215s built from 1966 onwards are in service in France, Greece, Spain, Thailand, Venezuela and Canada (Provinces of Quebec and Manitoba).

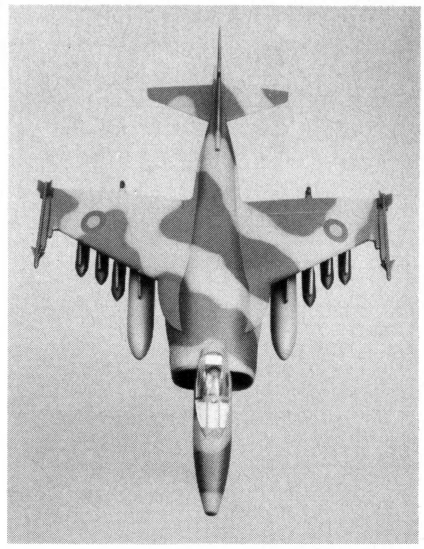
IAI Westwind Astra

Israel Aircraft Industries are developing a new 7/10-passenger business jet, the Westwind Astra, which is scheduled to be available for delivery to customers in 1984. Latest in the Westwind line, the Astra will be powered by two Garrett turbofans in the 731 series, cruise at Mach 0.8 and have a range of 3,000 nautical miles. It will have an advanced-design wing, designated "Sigma 2", offering high speed and long range with low drag.

Air Lanka, national airline of Sri Lanka, are now operating Lockheed TriStar 4R-ALE, leased from Air Canada, on their routes from Colombo to Europe. Their own two TriStars are scheduled for delivery in 1982 (see January 1980 issue)



"Big-Wing" Harrier—New photos of a model of the British Aerospace Harrier GR.5 which has a metal wing of 250 sq. ft. area, four more underwing pylons making a total of eight, and wing-tip rails for self-defence missiles. Other points to note are the LERXs (leading-edge root extensions), underfuselage strakes and Sea Harrier-type fuselage with raised cockpit and bulged dorsal section allowing more space for equipment



NEWS IN BRIEF

McDonnell Douglas airliner orders at the end of September totalled 361 DC-10s (of which 322 had been delivered) and 1,061 DC-9s (948 delivered).
The R.A.A.F. hopes to buy three Boeing 707-338Cs from QANTAS and convert them into tanker/transports. Extra funds are being sought from the Government.
Embraer's EMB-120 Brasilia airliner, due to fly in 1982, has attracted 86 options to date from: U.S.A. (44), U.K. (15), Brazil (10), Australia (10), France (5) and Canada (2).
Embraer have joined Aeritalia and Macchi in the AM-X light strike aircraft programme. The first prototype is expected to fly in 1983.
Euroair, the Biggin Hill-based commuter airline, have taken delivery of two new Embraer EMB-110P1 Bandeirantes ordered during the 1980 Farnborough Show.
Alkair—Per Alkaersig, the Danish commuter airline, have ordered an Embraer EMB-110P1 Bandeirante, which was delivered in November.
Taiwan's Aero Industry Development Centre at Taichung has completed a new twin-jet trainer, the AIDC XAT-3, which is expected to fly shortly. It has been developed for the Chinese Nationalist A.F.
Cranfield Airline College (see article in January issue, page 9) has deferred its launching because of the "current unfavourable airline economic climate".
The Egyptian A.F. recently took delivery of fourteen more Dassault Mirage 5SDE fighter-bombers, bringing total procurement to sixty-eight (including six 5SDD two-seat trainers and six 5SDR reconnaissance aircraft).
British Airways started a new weekly service to Beijing (Peking) via Bahrein and Hong Kong on 12th November using Boeing 747s.
Air Littoral, the French commuter airline based at Montpellier, took delivery of their third Embraer EMB-110P2 Bandeirante in October.
The Dewoitine D.520 fighter now flying again (see November, page 417) is No. 408, previously displayed in the Musée de l'Air, but incorporates parts of three others. Its initial flight this year was at Aulnat on 28th August.
The U.S.A.F. is to replace forty-eight McDonnell Douglas F-4D/E Phantoms in the 8th TFW at Kunsan and Taegu in South Korea with forty-eight General Dynamics F-16s.
Fuji Heavy Industries are to manufacture the Bell 214ST helicopter under licence in Japan. Fuji have been building Bell 204s and 205s since the 1960s.
Air Florida are acquiring Air California which will result in a combined fleet of twenty-eight Boeing 737s, one DC-10 and three DC-9s, with another four DC-9s on order.
French A.F. aircraft procurement under the 1981 budget includes twenty-two Dassault Mirage 2000s, twenty-one more Mirage F 1Cs (see November, page 417), and the first five of a new batch of twenty-five Transall C-160s.
D.H. Canada Beaver prototype C-FFHB, ex CF-FHB, c/n. 1, has been acquired from Norcanair by Canada's National Museum of Science and Technology and will be preserved at Rockcliffe.
Arabia—Arab International Airlines, a new Egyptian carrier based at Cairo, are to start operations on 1st December with two Boeing 737-200s leased from Maersk Air of Denmark.
The U.S.A.F.'s Alaskan Air Command is to receive McDonnell Douglas F-15 Eagles to replace F-4E Phantoms in the 18th and 43rd TFSs at Elmendorf AFB.
The Spanish A.F. has ordered four CASA C-212 Aviocar Series 200s equipped for search and rescue duties.
The R. Jordanian A.F. has ordered five more British Aerospace Bulldogs to supplement the twelve in service.
Air Cape, the South African domestic airline based at Cape Town, have purchased a Convair 580 from C-Z Leasing, Detroit, under a deal negotiated by USAir.
Rolls-Royce Motors, Crewe, will cease building Teledyne Continental aircraft engines on 31st December 1980. The original licence was granted in 1961.
The British Aerospace Hawk has won another round in the U.S. Navy's VTX-TS advanced trainer competition. Contracts for the next phase are likely to be placed in late 1981.
The Finnish A.F. has ordered three Gates Learjet 35As to replace its Ilyushin Il-28s on target-towing duties.
TUSAS, the Turkish Aircraft Corp., plan to build the Northrop F-5E under licence at their Murted plant. An agreement with Northrop is expected to be finalised shortly.

Guyana Airways started their first jet service on 26th October between Georgetown and Miami with Boeing 737-200 OY-APR which has been leased from Maersk Air of Denmark. Cheatline is green and yellow

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Air Affairs

A monthly commentary by JOHN STROUD

FOR MANY years the distinguished writer, pilot, and S.B.A.C. Show commentator Oliver Stewart, alas no longer with us, campaigned in *Aeronautics* and elsewhere for Britain to adopt the metric system of measurement. It would appear that his campaigning had little effect and that it was only the possibility of Britain obtaining EEC membership which brought about the Government desire to go metric.

The Metrication Board was established, presumably at vast expense, but has now fortunately been abolished. To judge from the material the Board sent me, mostly in two colours, its existence was a complete waste of time and money.

I bring this subject up because of a recent news item. A couple with a shop in the West Country had the audacity to sell food to local people with the weight marked on in Imperial units. Obviously this was undermining Government authority, putting the entire European Community at risk, violating the Treaty of Rome, and calculated to destroy the whole of Britain's world-wide trade—and at a time of large-scale unemployment and with all the disadvantages of a strong Pound (for years we have been hearing of the disadvantages of a weak Pound). What, as far as I know, these anti-social people in the West Country were not doing was breaking the law, because I believe that Metrication has not received Parliamentary approval.

The Court also appears to have had its doubts because the fine for this horrible offence was, I believe, 80p!

We are supposed to be practising national and local economy, therefore the only criminal aspect of this case was the State's stupidity in wasting time and money in bringing it.

Having read so far you may think I am anti-metric. Far from it, but I believe that there is a proper time and place, and price, for almost everything. Many of us were years ahead of the Government in using metric. Back in the dark ages C. G. Grey was using metric in *Jane's All the World's Aircraft*, and using it correctly, not as many writers are using it today. By this I mean that he used the authoritative measurements first with the conversions in parentheses. Thus British and United States aircraft dimensions, weights and performance were given in Imperial units followed by the metric. In the case of European aircraft the system was reversed.

Having for many years edited the Putnam aeronautical series, I have insisted on the use of metric in the same way although rising costs may force us to use only the applicable units without conversions.

If the Government thinks that I am going to write the span of the Avro 504K as 10,97 m. it can think again. The 504K was designed and built in Britain with a span of 36 ft. and that is the only true figure, whatever the EEC or anybody else thinks. I know the Russians had Avro 504Ks, called them U-1s and quoted the dimensions in metric.

From soon after the war I began studying airline operations, making numerous proving, training and inaugural flights with a variety of airlines. It may interest the Government and EEC to know that BOAC was using metric weights in 1948, Aquila certainly in 1954 and Cunard Eagle in 1960. Pan Am, Qantas, PIA and TAA were using pounds when I flew with them, and my records show that Air-India changed from Imperial to metric, as did Swissair!

When Britain was threatening to change fuel measurement from Imperial gallons to c.c., of all things, I asked a Greek friend how she bought petrol in Athens. Her answer was "gallons".

In aviation we must know and use both; if we are exporting we must use the measurement of the country to which we are selling. So let us stop the nonsense and let the Government keep its hands off the Avro 504K, because I for one will not be complying.

Airline Evening

ON WEDNESDAY, 10th December the London Society of Air-Britain will be holding their annual Airline Evening. Brian Walters, Assistant Commercial Manager U.K. and Ireland of Lufthansa, will present a historical arrangement of films from Lufthansa's archives and maintain continuity with numerous historical aviation anecdotes. The films will be: "Dornier Do X"; "The Long-Distance Runner", by McDonnell Douglas dealing with the DC-10 in Lufthansa service; "Check-up for a Millionaire", maintenance and overhaul at Lufthansa; and "Time Flies"—a history of the part played in commercial aviation by Lufthansa.

The meeting starts at 7.00 p.m. in the Lecture Theatre, Holborn Central Library, 32–38 Theobalds Road, London W.C.1; visitors welcome, admission 70p.

Egyptian A.F. strength

ACCORDING TO the U.S. Department of Defense, the Egyptian Air Force has the following Soviet aircraft in its inventory: 100 MiG-21 interceptors, 100 MiG-21 fighter-bombers, 120 Sukhoi Su-7s, 46 Su-20s, 90 MiG-17s, 24 MiG-23s and six two-seat MiG-23Us.

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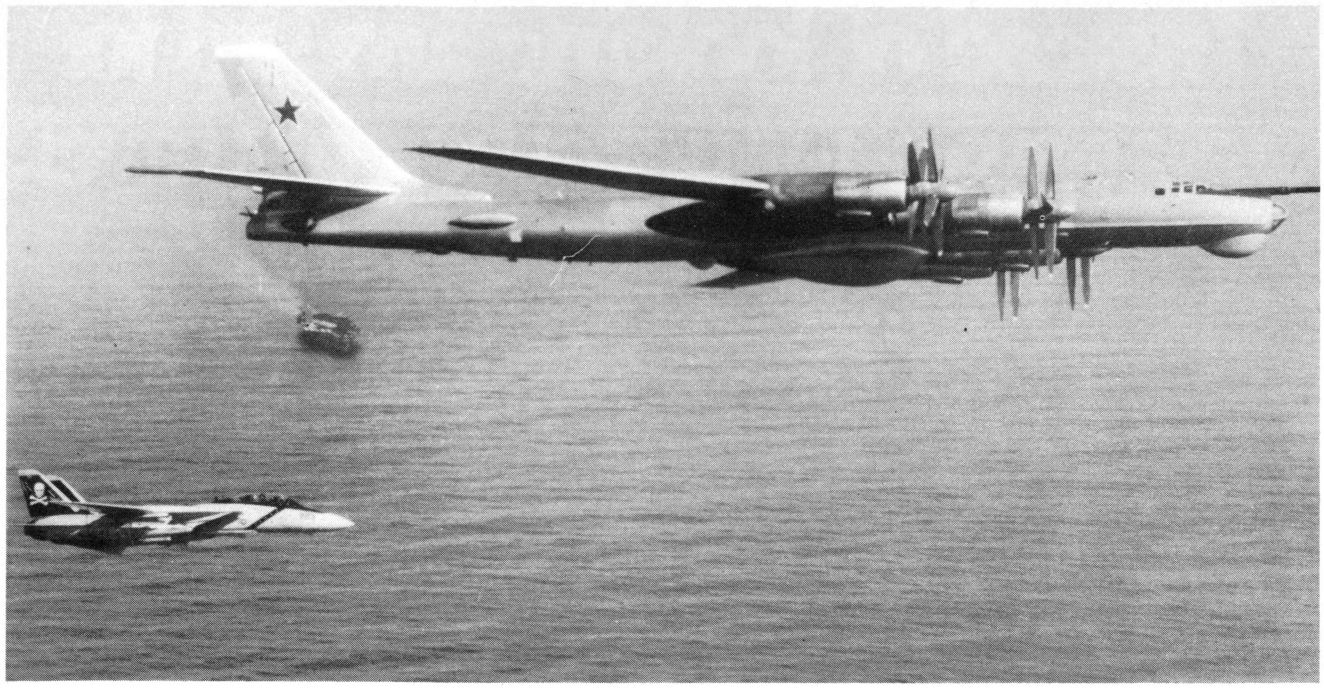


The exercise was attended by the usual Soviet snoopers but in all cases fighters from the U.S.S. "Nimitz" intercepted the Russian aircraft more than 100 miles away from the task group. Here a Grumman F-14A Tomcat of VF-84 escorts a Soviet Tupolev Tu-95 "Bear D" as "Nimitz" cruises in the background (Photo: U.S. Navy)

U.S.S. "Nimitz" in "Teamwork 80"

by MALCOLM ENGLISH

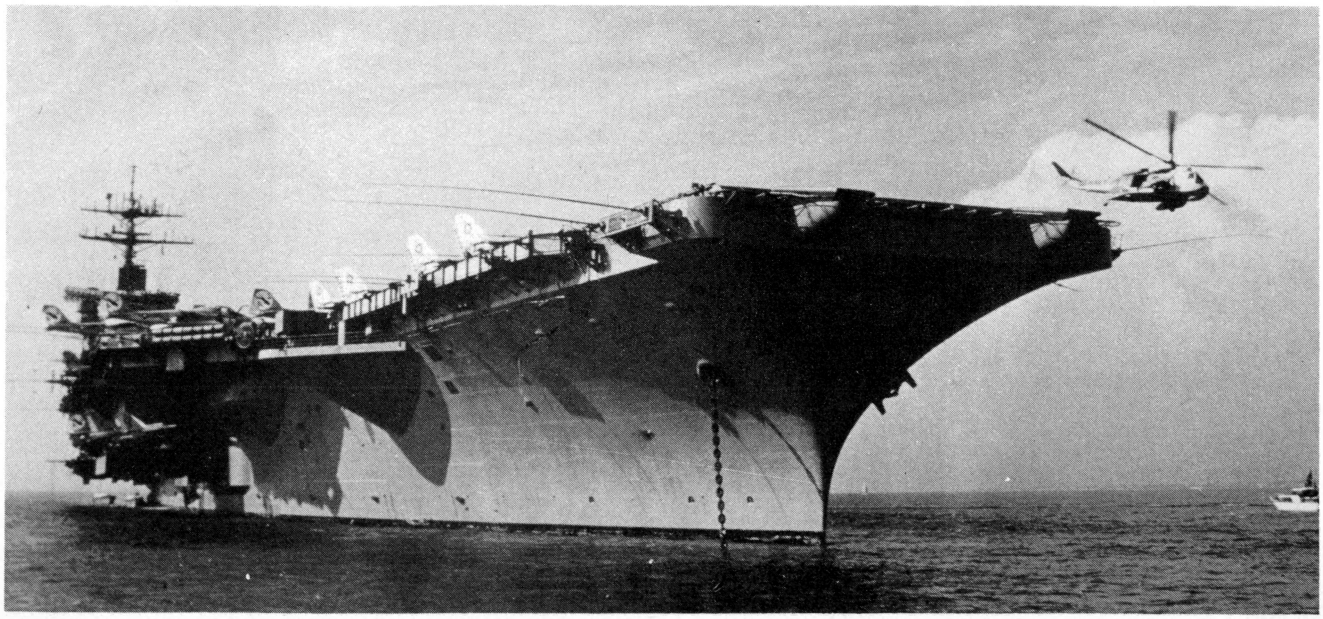
THE LARGEST aircraft-carrier in the world, the nuclear-powered U.S.S. *Nimitz* (CVN-68) recently anchored off Portsmouth at the completion of her participation in NATO Exercise "Teamwork 80". It was her third visit to Portsmouth since being commissioned on 3rd May 1975.

Nimitz played a leading role in the exercise which was held in the North Atlantic, English Channel, North Sea and Norwegian Sea, between 10th and 24th September. It was designed to test general defence plans to reinforce and resupply Europe and involved more than 170 warships and 400 aircraft.

Throughout "Teamwork 80" *Nimitz* was involved with anti-submarine duties and provided air cover for a task force and amphibious landing on the coast of Norway. Deep strikes into Europe were also carried out by aircraft from the carrier's attack squadrons.

The usual Soviet surveillance included submarines, surface ships and aircraft. "Backfires" made several

U.S.S. "Nimitz" at anchor off Portsmouth. Lifting off from the bows is Sikorsky SH-3H Sea King 148046 of HS-1 (Author's photo)



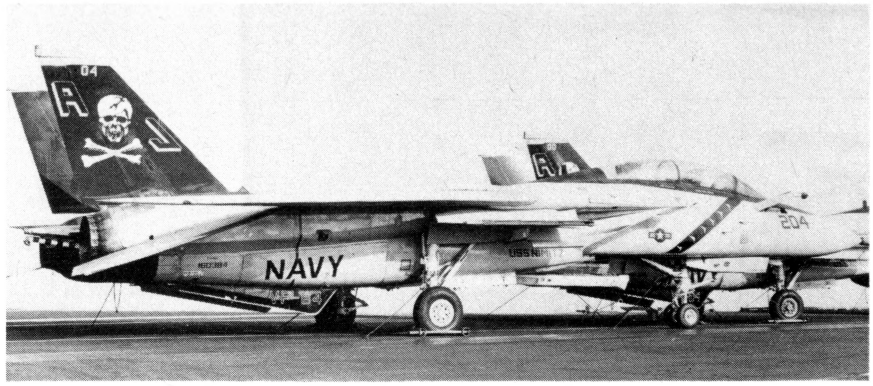
flights into the exercise areas but none overflew *Nimitz*, who had seventy-seven aircraft embarked, details of which are shown in the table.

U.S.S. "NIMITZ" AIR COMPLEMENT

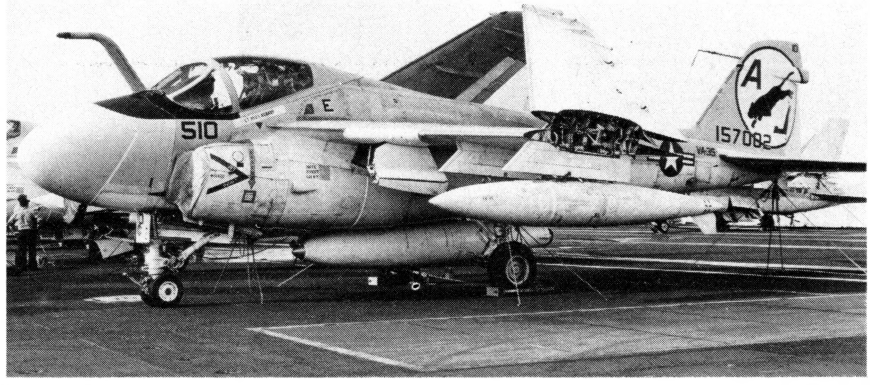
Aircraft	*Sqn.*	*Role*
A-6E Intruder	VA-35	All-weather attack
KA-6D Intruder	VA-35	Tanker + "daylight" attack
F-14A Tomcat	VF-41	Fighter/interceptor
F-14A Tomcat	VF-84	Fighter/interceptor
A-7E Corsair II	VA-82	Attack
A-7E Corsair II	VA-86	Attack
S-3A Viking	VS-24	Long-range anti-submarine warfare (ASW)
E-2C Hawkeye	VAW-124	Airborne early warning (AEW)
SH-3H Sea King	HS-1	ASW/rescue
SH-3H Sea King	HS-9	ASW/rescue

It will be observed that neither electronic counter-measures nor reconnaissance squadrons were on board the ship during "Teamwork 80", although it is understood that some of the Tomcats had recce. as a secondary role.

Flying took place almost every day from leaving Norfolk, Virginia, on 27th August to the completion of the exercise. A typical number of sorties during "Teamwork 80" was of the order of 90 a day. However, bad weather halted operations for a while with visibility at less than a mile and a ceiling of 200–300 ft. The Commanding Officer of U.S.S. *Nimitz*, Capt. John Batzler, stated that during hostilities flying would have continued. He thought that participants "got a lot of good work out of the exercise" and "there was good co-operation between the Navy forces".

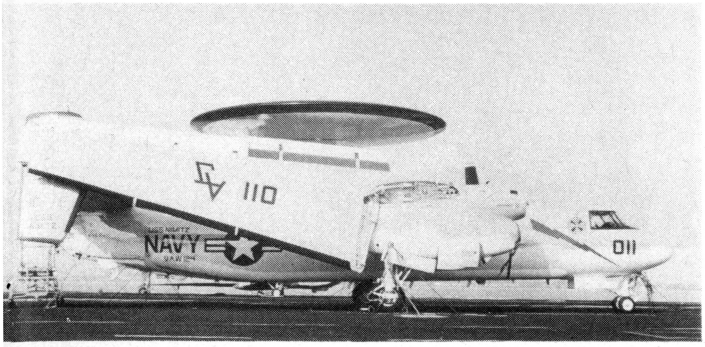


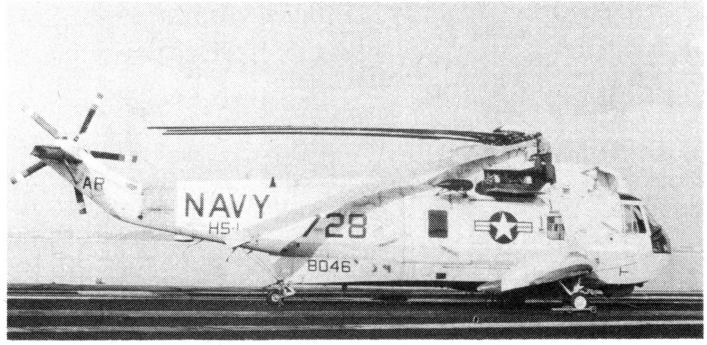
Grumman F-14A Tomcat 160384 of VF-84 "Jolly Rogers" which shares the air defence task with similarly equipped VF-41 "Ace of Spades" (Photo: Barry Jones)

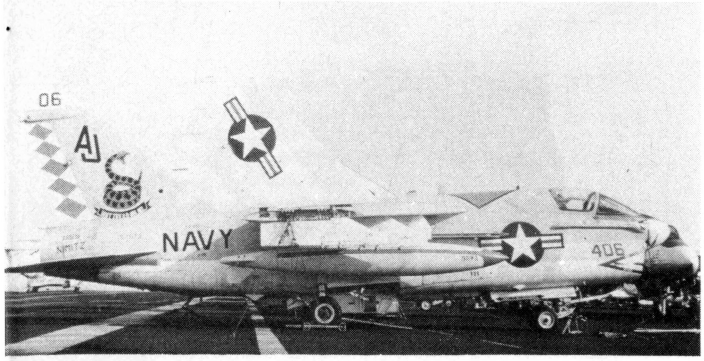


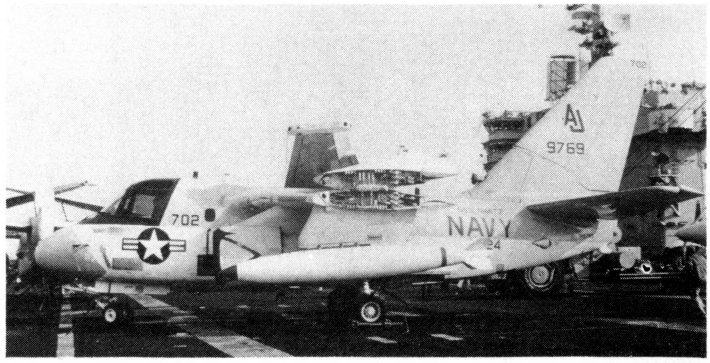
Grumman A-6E Intruder 157002 of VA-35 "Panthers". Also aboard were some KA-6D tanker versions of the Intruder for in-flight refuelling (Photo: Barry Jones)

Top Left: *The "eyes" of the Fleet, Grumman E-2C Hawkeye 161094 of VAW-124, seen undergoing a propeller change.* Right: *For anti-submarine work, Sikorsky SH-3D Sea King 148046 of HS-1.* Bottom Left: *Vought A-7E Corsair II 157573 of VA-86 "Sidewinders", one of the few "Nimitz" squadrons still sporting colourful markings.* Bottom Right: *Long-range ASW is the role of Lockheed S-3A Viking 159769 of VS-24 which has 300-gal. auxiliary tanks under its wing pylons (Author's photos)*









Ruoms residents for the summer were two CAARP CAP. 10B aerobatic trainers of the Association Aéronautique Alpes/Beaujolais Voltige from Lyon; F-BXHJ, c/n. 67, illus. (All author's photos)

Travels with a Camera in Southern France

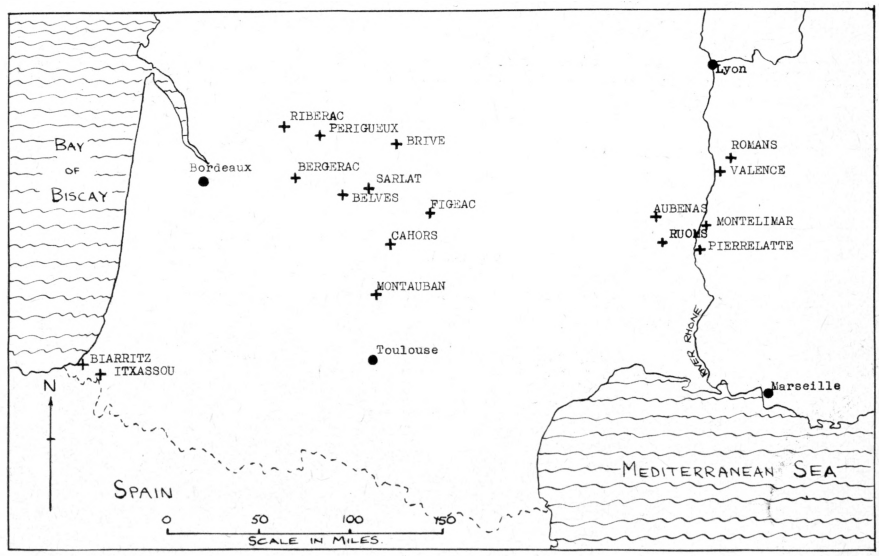
by GEOFFREY P. JONES

OVER A hundred years ago in 1868 Robert Louis Stevenson set out from Le Monastier on a leisurely jaunt with only his donkey Modestine for company. He met and described the people and places he visited during his travels and recorded them for posterity in his book *Travels with a Donkey in the Cevennes.* While in no way trying to emulate Stevenson, his inspiration was at the back of my mind when I arrived in Biarritz at the start of a 600-mile journey that would eventually end in the Rhone valley near Lyon.

My aim was to look at the airfields and aircraft of this part of southern France, passing by the larger centres of Toulouse, Bordeaux and Lyon and in particular visiting some of the more popular holiday areas of the Dordogne, Lot and Auvergne.

Parme airfield (very windy when I arrived) has served Biarritz since 1922 but before that two other sites had been in use, the first being chosen by Louis Blériot at the invitation of Doctor Gallard, the then President of the Comité d'Aviation Bayonne—Biarritz, which had been formed the year before to promote aviation in the region. By 29th March 1910 an airfield on the banks of the River Nive was ready for an inaugural air race and in the presence of King Edward VII aviators, including Blériot, Le Blanc, Chauvez, Duray, Mignet and Leforestier, raced in their machines around a quadrilateral course—a magnificent opening. With another airfield at La Chambre d'Armour on the coast in use as well, Biarritz was well served. By 1920 the shortcomings of both these fields were becoming obvious and a fresh site was chosen on the plateau of Parme to the south-east of Biarritz. In May 1922 Parme began its long career. From the 550-metre grass strip to today's 2,250×45-metre concrete runway, Parme can now be described as the "Gateway to Iberia" with a regular flow of aircraft passing through north and south to clear customs.

In 1957 Avions Louis Bréguet built a large factory on the south side of the aerodrome where sub-assemblies for the Br.765 Sahara and Br.1050 Alizé were made. Now with Avions Marcel Dassault—Breguet Aviation in large letters on the front, the factory concentrates on Fokker Friendship fuselage construction and overhaul of Mirage F Is.



Right: *Map showing aerodromes visited by the author*

Below: *Romans (St. Paul) had a Danish visitor, Schleicher Ka-6CR OY-XEA, which was keeping company with the local club's Ka-6 F-CDYI*

At the time of my visit interesting aircraft noted at Parme were Dornier 28B F-ZBBK of the Securité Civile doing anti-smuggling patrol work on the French-Spanish border, Dornier Do 27 F-BUOU and Cessna 170 F-BGOZ from Pau, Caudron C.601 Aiglon F-PFLB visiting from Bordeaux/Yvrac and Pyrenair's Twin Otter F-BYAG which operates daily Pau, Lyon, and Toulouse services from Biarritz.

From Parme it is a relatively short journey up into the foothills of the Pyrenees and to the Centre de Vol à Voile (Gliding Centre) at Itxassou. Situated

on the top of a hill a few miles from the Spanish border with the mountains rising steeply behind and panoramic views to the Bay of Biscay to the west, this small grass strip is a-buzz with activity in the summer with MS.893A Rallye Commodore 180 F-BNSR used as the glider tug and an assortment of gliders, including two Wassmer Wa 30s, a Nord 1300 and a Schleicher K.8. Pride of the airfield, apart from the splendid new club house and dormitories, was Piper J-3C-65 Cub F-BGXP (c/n. 12657 and ex OO-GAE), but after many years at Itxassou it was recently sold in Ireland as EI-BIO.

Brive-la-Gaillarde was not so busy as in 1978 when the author photographed Stampe SV.4C F-BCLD during the R.S.A. rally, attended by 300+ aircraft

Montauban

Following the foothills of the Pyrenees east, through Pau, Tarbes and Auch to the Tarn valley, I arrived at Montauban. To the north-east of the town is the airfield home of the Aero Club Montalbanais, about ten privately owned light aircraft and a Wing of *ALAT* (*Aviation Légère de l'Armée de Terre*). They now operate Alouette IIs and Pumas, but as a reminder of equipment in use until relatively recently Nord 3202 No. 66 is displayed on a plinth in front of the aero club. Also being operated, but not for very much longer, are Max Holste MH.1521 Broussards for training and liaison—among the last survivors in France of around 335 Broussards built during 1952–59.

Heading north from Montauban, along *Route Nationale 20,* just south of Cahors one comes to Lalbenque airfield. Looking very impressive with its modern control tower, club lounge, bar and hangar, Lalbenque in fact has no regular scheduled services, although DHC-6 Twin Otters of Compagnie Aérienne du Languedoc visit the field on charter flights. It is also the home of the Aero Club de Quercy, which operates MS.880B Rallye F-BPGM, Wassmer Wa 41 Baladou F-BOBC and Cessna F.150M F-BXQN.

The historic town of Cahors, with its

(continued after photos on page 466)

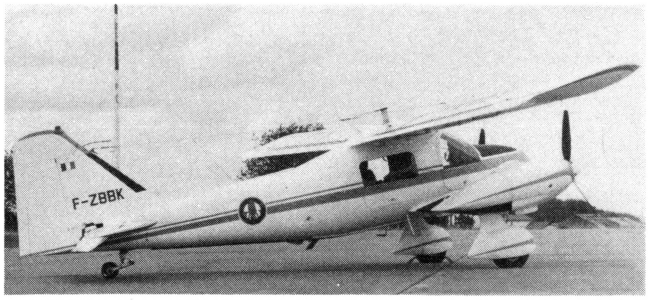
Cahors (Lalbenque) had on its apron SOCATA MS.880B Rallye Club F-BPGM of the Aéro Club de Quercy and Jodel DR.1050 Ambassadeur F-BITA from La Rochelle

Right: *Valence (Chabeuil) with the Alps behind and visiting Cessna 210 F-BFRQ from Les Mureaux near Paris and Cessna 421B F-BTDY (ex G-AZPT) which had arrived from Metz*

Below left: *Ruoms is the home of the Aéro Club de l'Ardèche whose latest aircraft is SOCATA TB-10 Tobago F-GCED, c/n. 76.* Right: *Belves (St. Pardoux) with Gardan GY-80 Horizon F-BLKU on a visit from Montargis*

Itxassou.—Piper J-3C-65 Cub F-BGXP (since sold as EI-BIO) in front of the magnificent new club house and dormitories

Perigueux (Bassillac).—Blue and white Cub F-BFYO, bearing former identity N29240 on its tail, operated by U.A.P.



Biarritz (Parme).—Left: *Dornier Do 28B F-ZBBK of the* Securité Civile *takes a break from anti-smuggling and French-Spanish border patrol duty.* Right: *Also at Parme was a visitor from Pau, Dornier Do 27Q F-BUOU*

Montelimar (Ancone).—Robin DR 400/100 2+2 F-BXVA of the local Aéro Club de Montelimar et de sa Region

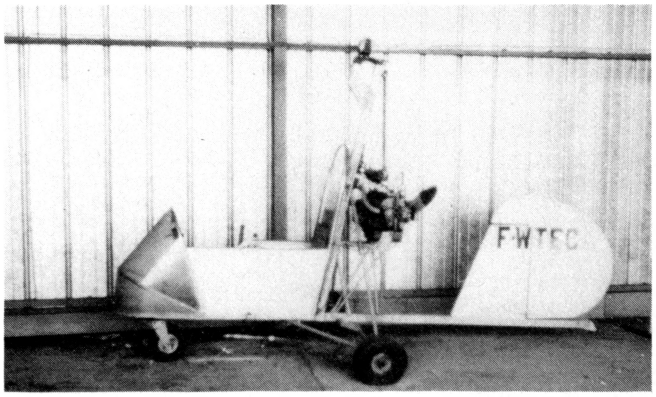
Aubenas (Vals Lanas).—Jodel D.140C Mousquetaire F-BRQD of the resident Aéro Club d'Aubenas, or Ardair for short

Above: *Pierrelatte.—Socafrance S.A.'s Wassmer Wa 421-250 F-BPTC, c/n. 411, visiting from Limoges*

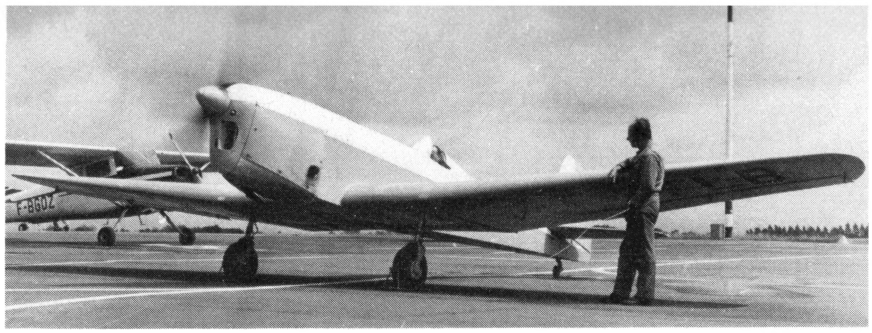
Bottom left: *Bergerac (Roumanière).—Antonov An-2TD F-BTOM used by CERPSA, the local parachute club*

Bottom right: *Figeac (Livernon).—Bensen B.8M autogyro F-WTEC*

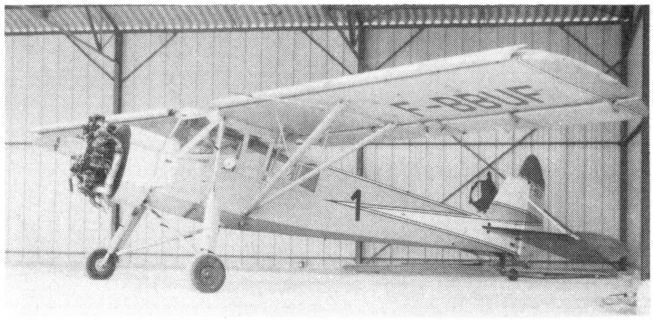
Above: *Bergerac (Roumanière).—Wassmer Wa 52 Europa F-BUKS of the Aéro Club de Bergerac*



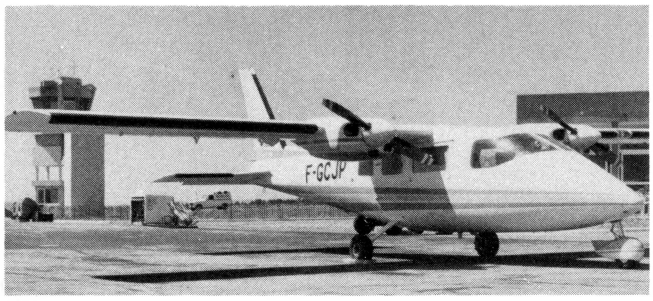
Southern France . . .



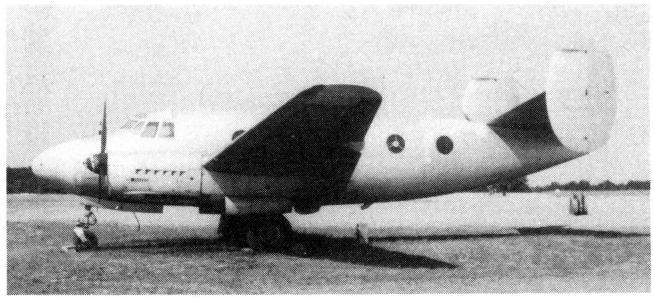
Right: *Biarritz (Parme).—One of the most interesting types seen here was Caudron C.601 Aiglon F-PFLB, a pre-war design first produced in 1935, which had arrived from Bordeaux. Behind is Cessna 170A F-BGOZ from Pau*
Below: *Montelimar (Ancone).—Jurca MJ.5 Sirocco F-POIP, a home-built normally at Pierrelatte with the Aéro Club Tricastin*



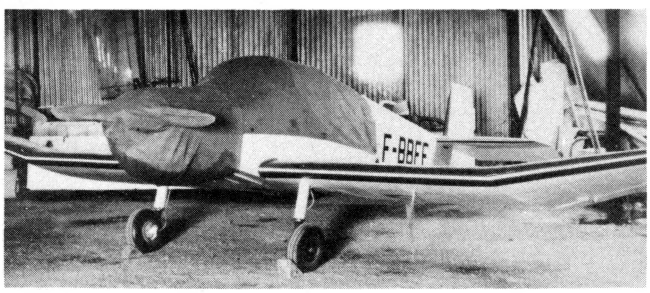
Riberac (Tourette).—Morane-Saulnier MS.505 Criquet glider-tug F-BBUF (French derivative of the Fieseler Storch)



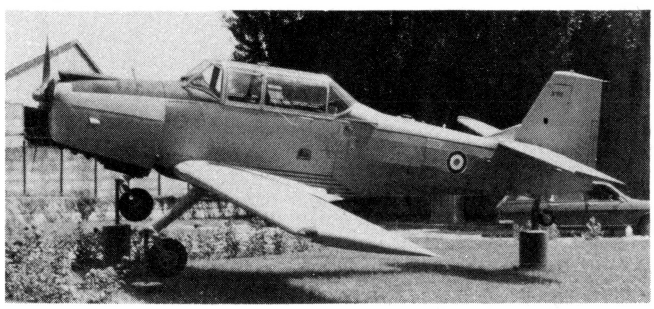
Aubenas (Vals Lanas).—Auxiair's Partenavia P.68B F-GCJP which operates a twice-daily return service to Lyon



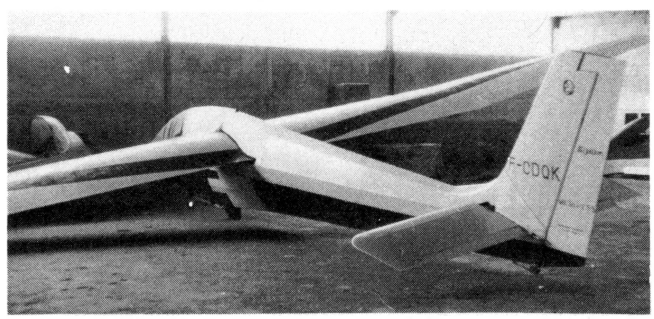
Sarlat (Domme).—Unusual gate guardian here is this ex-military Dassault MD.315 Flamant, devoid of any markings



Above: *Sarlat (Domme).—One of the oldest Jodel D.112s in France, F-BBFF was first registered in 1954*



Above: *Montauban.—All-yellow Nord 3202 No. 66, the gate guardian, is preserved outside the Aéro Club Montalbanais*
Bottom Left: *Pierrelatte.—Rutan VariEze F-PYHR built by Mons. Briquet was the first French V.E. to fly*
Bottom Right: *Pierrelatte.—Wassmer Wa 30 two-seat glider F-CDQK*



Riberac (Tourette) with visiting Jodel DR.250 Capitaine F-BMZS from Saintes (foreground) and resident MS.883 Rallye 115 F-BRRC of the Aéro Club Jean Mermoz

Southern France . . .

famous fortified bridge across the Lot, the Pont Valentre, has been a flourishing commercial and university city since the Middle Ages but at the height of summer is a traffic bottle-neck and overcrowded, so it was soon time to leave the river valley and climb on to the limestone plateau of the Gramat Causse on the way to Figeac. Seemingly in the middle of nowhere is Figeac (Livernon) airfield where the Aero Club de Figeac et du Haut Quercy operates MS.880B Rallyes F-BKTN, F-BPYT and F-GBCK and Jodel D.1051 Ambassadeur F-BMGG. Two other interesting residents are Bensen B.8 autogyro F-WTEC and Stampe SV-4A F-BEPY. Air Rouergue, based at nearby Rodez, frequently operate charters to Figeac using their Twin Otters and occasionally Fokker F.27 Friendships.

Dordogne region

Next I travelled into the Dordogne region, now well known to British tourists, and on to the "*bastide*" town of Domme, situated on a rocky crag overlooking the luscious plain of the Dordogne valley. Here in another magnificent setting is Sarlat (Domme) airfield, a grass strip—alongside the town—and home of Aero Club de Sarladais. The airfield is exceptionally busy in summer, with the club's Cessnas and Rallyes giving pleasure flights down the valley, affording panoramic views of the many chateaux at La Roque Gageac, Beynac, Castelnaud and Montfort as well as Domme itself. There is always a steady influx of visitors from other parts of France, Holland and Germany. A Dassault MD.315 Flamant acts as gate-guardian to the airfield, which is also the base of what I believe to be one of the oldest Jodel D.112s in France, F-BBFF, first registered in 1954.

Travelling west, down river, I came to a small airstrip at St. Pardoux near Belves, base of Les Ailes Belvesoises who fly MS.880B Rallye F-BSVA; visiting St. Pardoux with me was Gardan GY-80 Horizon F-BLKU from Montargis.

After passing through the fields of tobacco, maize and vines of the lower Dordogne, and the famous vineyards of Chateau Monbazillac, I reached Bergerac (Roumanière) aerodrome where it was rumoured that an Antonov An-2 biplane was in use by the local parachute club. The rumours were well founded and F-BTOM, an An-2TD, towered above me as I entered the hangars. With the unwieldy name of Centre Ecole Régionale de Parachutisme Sportif d'Aquitaine, or CERPSA for short, this establishment also has a MH.1521 Broussard, F-BICX, and the remains of another, F-BEHE, presumably cannibalised for spares.

Bergerac is a busy airfield, with Cyrano Aviation operating the whole range of activities from air taxis to "*Baptismes d'Air*". Alongside them were P.A.S. Air Engineering and the Aero Club de Bergerac, with daily Twin Otter schedules by Compagnie Aérienne du Languedoc (CAL) completing the picture; a couple of interesting visitors were Cherokees 6V-ADH and TZ-ACB.

To the north is Riberac, a small town on the banks of the River Dronne, with an airfield to the west at Tourette which like Itxassou, is very busy in the summer with students camped on the airfield undergoing gliding training. MS.893 Commodore F-BPMJ was in use as glider tug but unfortunately hangar-bound at the time of my visit; but frequently used for towing is MS.505 Criquet F-BBUF with its large 230-h.p. Salmson radial. The Aeroclub Jean Mermoz also operates from here with Rallye 115 F-BRRC and has recently retired a long-serving aircraft, Nord NC.858 F-BBJY. Jean Mermoz, who made numerous pioneering flights across the South Atlantic in the 1920s in Latécoère floatplanes until lost without trace in 1936, was a former member and President of the Club and the present Aeroclub at Riberac are proud to perpetuate his memory.

Perigueux

Capital of Perigord and the Dordogne region is the old city of Perigueux with the white domes of the St. Front cathedral dominating this important industrial, commercial and tourist centre. Its airport to the south-east of the city at Bassillac is again served, as was Bergerac, by Twin Otter services of CAL linking the city with Limoges, Poitier and Brive. The light aircraft operations of flying club, maintenance, air taxis, etc. are operated by Union Aéronautique du Perigord (U.A.P.) and they were one of the first clubs in France to obtain Fournier RF-6Bs, F-GADD being obtained in mid-1976. A lovely blue and white Piper J-3C-65 Cub, F-BFYO, is also on strength and at the time of my visit Beechcraft A-36 Bonanza F-ODAK from the Aero Pora Club–Dakar and MS.880B Rallye D-EJNO were also visitors.

Final stop in this region of France was to the east at Brive-la-Gaillarde (or Brive "the bold" which is the translation). Host in 1978 to the French home-builders rally, the R.S.A., the airfield then had more than 300 light and homebuilt aircraft assembled there, but on this, my second, visit it seemed somewhat deserted. Nevertheless, the Aero Club de Brive operates Jodel D.112 F-BJPV, Stampe SV.4s F-BBIY and F-BCLD, Fournier RF-4D F-BPLM, MS.880 Rallye F-BPYJ and Robin DR.400/180 F-BVDJ. Visiting from Grenoble was the Aero Club du Dauphin's CEA DR 380 Prince F-BSJC and Pilatus Porter F-BOSZ.

From Brive I headed up into the mountains of the Massif Central and the Auvergne, making for the Ardeche Department to the west of the Rhone Valley. After crossing the watershed between the Atlantic and Mediterranean, the road wound down through the mountains of the Cevennes, travelled all those years before by R.L.S. and his donkey, to Aubenas, a relatively small town with narrow streets lying in a loop of the River Ardeche with its

As well as civil aircraft Montauban is the home of French Army types, including this ALAT *Max Holste MH.1521 Broussard, No. 42; note tail of Gazelle behind*

fortress dominating the views. To the south of the town and atop a hill, reached by a winding road, is Aubenas-Vals Lanas airfield, reminiscent of Cahors with its new control tower and terminal building.

Not a busy airfield but between April and October it is served by a twice-daily scheduled service operated by Auxiair linking Aubenas and this region of the Ardeche with Lyon (Satolas). A Partenavia P.68B, F-GCJP, is used and in conjunction with Air Inter a full inter-line agreement means that dozens of destinations in France can be reached easily. The Aero Club d'Aubenas (trade name Ardair) uses Wassmer Wa 40 Super IV F-BKCT, Rallye 100ST F-GBKA and Cessna F.172M F-GAQN which during the summer spend a lot of their time flying sightseeing trips down the rugged and overwhelming Ardeche gorge. The scenic beauty of the area brings many visiting aircraft and during my brief stay these included Cessna 177RG Cardinal PH-VWP, King Air 200 PH-BGY and Cessna 182F G-ASNN.

A few miles down the road is the little airstrip of Ruoms in a marvellous setting on a tract of flat land between the Ardeche and Beaume rivers and with Rocher Sampzon towering above to the south. Like Aubenas it is a popular base for visitors from all over Europe visiting the Ardeche, although somewhat more basic for facilities. Cessna FR.172K Hawk XPII D-EGTF and Cherokee D-EFLE called in to join resident Rallyes F-BVAK, F-BULR and F-BXDD, Tobago F-GCED and Robin DR 400 F-GBAH. Also in residence for the summer were the Association Aéronautique Alpes/Beaujolais Voltige based in Lyon but conducting their summer aerobatic training school here with two CAARP CAP.10s, F-PXKE and F-BXHJ. I learnt that the late Neil Williams was a former and highly respected member of the A.A.A.B. and the diving eagle on their badge is a symbolic tribute of the esteem in which he was held in this part of France. Another touching feature at Ruoms, under the shade of the olive trees next to the club house, was a stone bust of Raymond Yvan who died in 1951 at the age of 48 and who was founder of both the aerodrome and the Aero Club de l'Ardeche at Ruoms.

Pierrelatte

Down the Ardeche gorge and its beautiful scenery and into the Rhone valley I came to the small grass airfield at Pierrelatte. The highlight here was Monsieur Briquet's Rutan VariEze F-PYHR (c/n.1991) in the characteristic subservient bowing attitude, the first French V.E. to fly. The resident Aero Club de Tricastin operates five assorted aircraft: Jodel D.117 F-BIOC, Rallye F-BRDN, Wassmer Wa 52 Europa F-BTLN, Robin DR 400/160 Chevalier F-BXVC and Jodel D.119 F-PPPD.

A short drive north brings one to the home of nougat, Montelimar, and its Ancone airfield alongside the RN.7. Until now I had seen hardly any home-built aircraft and their F-P series registration signifying the issue of a *Certificat de Navigabilité Restruit d'Aeronef* (Restricted C. of A.), but with the VariEze and Jodel at Pierrelatte and now Jurca Sirocco F-POIP, GY-201 Minicab F-PKFZ and Jodel D.112 F-PJCC at Montelimar, things definitely seemed to be looking up. The Aero Club de Montelimar et de sa Region was founded in 1925 but operated from Istres in the Rhone delta for five years until, under the leadership of Pierre Espiard, they obtained their first aircraft, a Potez 36, and moved into Ancone. After the war the club reorganised, flying a single Stampe until today an assorted fleet includes Robin DR 400 F-BXVA, Wassmer Wa 80 Piranha F-GAIO and Cherokee Archer F-GBBU.

Continuing north, Valence (Chabeuil) was the next stop. An important industrial town, Valence is served by the scheduled services of Europe Aero Service (EAS) who operate daily to Paris and Nîmes. An *ALAT* base, important customs aerodrome between France and Switzerland, home of Ardair (who also operate at Aubenas) and the Aero Club de Valence, it is a busy airfield. Aircraft operating from the *ALAT* side of the field were Cessna L-19 Bird Dogs, Cessna 411s, Alouettes and Pumas.

Journey's end was now in sight with another short drive north to Romans (St. Pauls) which is located just to the south of Lyon. The Aero Club de Romans operates from this grass field but the main activity seemed to be from the powerless side in the form of *vol à voile* (gliding), the highlight of which was Danish Schleicher Ka-6CR glider OY-XEA which had been trailered south and was enjoying the excellent weather and the thermals of the foothills of the Alps which rise up rapidly to the south-east of Romans. Another Ka-6, F-CDYI, was keeping it company together with Wassmer Wa 30s F-CCYP and F-CCZU, and Grob Astir F-CEXZ, with MS.893 Commodore F-BOTL doing tug duties together with a somewhat dilapidated Citroen 2 CV! There was the usual assortment of club aircraft, including Druine D.5 Turbi F-PHQZ and Cubs F-BBTD and F-BOUJ.

Salt of the earth

By now it was time for me reluctantly to pack up my camera and notebook and make a speedy journey back to Britain. Perhaps it had not been such a challenging journey as that undertaken by R.L.S. in 1868, but one which I like to think was conducted in the same spirit, which showed me French light aviation at its local level, enabled me to meet those aviators who, to use a British expression, are the salt of the earth, and at the same time see some of the most beautiful countryside in France.

Three residents of Valence (Chabeuil): Fournier RF-6B F-GADR and Cessna F.152 F-GBJM, both of Ardair, with Beechcraft 58 Baron F-BXOR taxi-ing out

Visitors to Perigueux (Bassillac) included Beechcraft A-36 Bonanza F-ODAK of the Aero Poro Club—Dakar and MS.880B Rallye D-EJNO from Germany

Close Support Aircraft

Is high manoeuvrability necessary for their survival?

by Dr. J. E. HENDERSON, Council Member of the Air League, in collaboration with Sir DENIS SMALLWOOD, Air League Chairman

THE ARTICLE "Will they ever get off?" (April 1980 issue, pages 128–131) argued the general case for close air support of land forces and the particular need for a V/STOL, or at least a STOVL, capability to enable close support aircraft to operate after enemy pre-emptive and subsequent attacks. The object of this follow-up article is to analyse in a generalised way what is required in the 1990s to enable the close support aircraft to penetrate enemy defences to the target and to survive the return flight to base.

Factors for survival

It is now generally agreed by Western Air Forces that the lower an aircraft flies through defences the greater is its chance of survival, and this has been proved by comprehensive computer simulations, carried out in the U.K. and the U.S.A., of aircraft operations through air defences. Indeed, it is essential for aircraft to fly as low as 100 ft. above ground-level against the improved low-level surface-to-air missiles (SAMs) which will be available in the 1990s. This general conclusion applies to operations against all types of ground defences and also, although to a lesser extent, to operations against fighter defences.

By the 1990s the close support aircraft will have to fly through a range of improved Warsaw Pact low-altitude air defences, 23-mm. and 57-mm. guns, low-level SAMs, air-defence fighters equipped with pulse doppler airborne radar (AI) and both medium-range snap-down and "agile" short-range missiles, and finally air-superiority fighters, some at least of which will be equipped with "agile" short-range missiles but none with pulse doppler AI and snap-down weapons.

The requirement for close support aircraft to fly as low as possible and no higher than 100 ft. leads to the conclusion that an aircraft speed of about 450 knots is preferable to significantly greater speeds because pilots' ability to fly at low altitude is significantly improved thereby, as demonstrated by R.A.F. flying trials. On the other hand, this speed, compared with greater speeds, would of course result in ground defences having more time to react effectively; it would also increase the time spent by close support aircraft over enemy territory, allowing more enemy fighters to be brought to bear. These arguments apply with even greater force for lower aircraft speeds, to the extent that the aircraft eventually becomes unacceptably vulnerable, since there is no significant compensating reduction in aircraft altitude possible with speeds below about 450 kt.

On balance therefore, it might be desirable to have a greater speed capability, say up to about 550 kt., available for use as necessary.

Speed and altitude will, of course, be interchangeable factors to be used in maximising invulnerability to defences, and in improving target acquisition and attack accuracy. In particular, flying trials and mathematical modelling have shown that an aircraft speed of around 450 kt., when flying at low altitude, gives a significantly higher chance of target acquisition against close support type targets, plus increased attack accuracy, when compared with significantly greater speeds; and it may be necessary for a close support aircraft to fly at about this speed near the target.

It should be noted that the advent of stand-off missiles will not only reduce losses to enemy defences, but will also reduce the amount of time during which the aircraft has to reduce speed for acquisition and attack. It is important to observe that the technical problems of differentiating between a real target such as a tank and other objects in the background with similar signatures are now being solved as new seekers and sophisticated signal processing become available, which can be packaged into small stand-off missiles suitable for carriage by close support aircraft.

Reducing losses

Whatever the aircraft speed within the speed bracket discussed above, computer simulations of aircraft operations through enemy air defences have demonstrated the very significant reduction in losses which result from a combination of tactical routeing (to avoid known defence concentrations) and tactical formation flying, together with low-altitude flight, the use of ECM and other defence suppression measures such as decoys, plus, most important, the use of stand-off missiles wherever possible. In fact, the combination of these measures has been shown to contain losses to an acceptable level.

It is important to observe here that, even if the losses had been high, the requirement for close support aircraft could have been negated only if and when there was an alternative method of attack. When the tanks or other targets are beyond the range of Army weapons, or when the Army cannot cope with the number and lateral dispersion of targets facing it, there is no other way to attack than by air. In addition, the Army is firmly in support of the requirement for close support aircraft.

The final vital point to note is that the very existence of close support aircraft means that the enemy has to devote very considerable resources not only to defensive systems such as guns, SAMs and interceptors, but also to offensive systems such as counter air forces to attack the close support aircraft at base.

High manoeuvrability

There has been a great deal of argument about the need for high manoeuvrability to give the close support aircraft an air-combat capability in order to increase its survival chances against enemy defences. The first thing to note is that the adoption of high-manoeuvrability tactics would lengthen the exposure time to enemy defences. However, the vital issue here is that high manoeuvrability would not give the aircraft any significant self-defence capability against three out of four possible types of defence, and the capability against the fourth type of defence would be provided only in very restricted and unlikely circumstances, as discussed below.

(1) High manoeuvrability would not improve the survival chance against snap-down air-to-air missiles launched from air-defence aircraft, equipped with pulse doppler AI, which would be on patrol at altitudes of about 20,000 ft. Against such defences the close support aircraft would aim to employ the survival measures of low altitude and reasonably high-penetration speed to reduce exposure time, together with the use of ECM, decoys and tactical formations to reduce defence system effectiveness. In addition, and most important, the exposure time to these defences would be further reduced by the use of stand-off missiles.

(2) Against the L.A.A. batteries of 57-mm. and 23-mm. guns various defence measures would be adopted. Tactical routeing would be used to reduce exposure time, while low altitude, reasonably high speed, ECM, decoys and tactical formations would be used to reduce the effectiveness of the guns. When these measures have been taken, high manoeuvrability would not improve further the survival chances against the L.A.A. batteries.

(3) Similar arguments to those for survival from gun defences apply to survival chances against sophisticated low-altitude SAMs. They would not be improved by high manoeuvrability in the close support aircraft.

(4) On the other hand, high manoeuvrability would give the close support aircraft some self-defence capability against air-superiority fighters not equipped with pulse doppler AI

Examples of the R.A.F.'s current close support types, from units based in Germany—Left: *V/STOL Harrier GR.3s of No. 3 Squadron, Gütersloh.* Right: *Jaguar GR.1 of No. 2 Squadron, Laarbruch, seen sweeping low over hardened aircraft shelters*

and snap-down missiles, which would therefore have to make visual and essentially same-altitude interceptions.

However, not only is this "visual" fighter only one of four possible enemy defences, but its use prohibits the use of any of the other three. Guns, SAMs, and pulse doppler fighters can all be used simultaneously, but if "visual" fighters are used, the other three defence types dare not fire for fear of shooting down the visual fighters which would be inextricably mingled with our close support aircraft. This must cast doubt on whether the visual fighter would be used in this way.

Further, the short time during which the close support aircraft would be over enemy territory means that air-superiority fighters could intercept only if they were on standing patrol over the battlefield, which is an expensive method of operations *per se*, and particularly for the enemy's dual-purpose aircraft intended for battlefield attack in addition to the air-superiority role. It is therefore at least questionable whether they would operate standing patrols.

Operational arguments

In addition, there are operational arguments which detract from the need to provide high manoeuvrability for close support aircraft. First, the provision of such a capability could not on average give more than a 50/50 chance of survival to these aircraft in combat with visual fighters armed with "agile" short-range missiles. On the other hand, it could be argued that the close support aircraft would have a better than 50 per cent chance of survival by ignoring the danger from enemy defences and remaining at their penetration altitude of 100 ft. (or even better by decreasing altitude) where the effectiveness of visual fighters, essentially limited to same-altitude attack, is questionable.

Secondly, the adoption of a self-defence manoeuvring posture by the close support aircraft would often mean abandonment of the aircraft's primary mission. Thirdly, even if the self-defence combat was successful and the primary mission did not have to be abandoned, the close support aircraft would have at some stage to continue its flight to the target when it would be subject to other enemy defences; equally, the return flight cannot consist entirely of self-defence combat and some of it will have to be flown at low altitudes when the aircraft will be liable to attack by enemy defences.

In other words, during a battlefield attack mission, reliance will have to be placed eventually on low-altitude flight in combination with the use of ECM, decoys, tactical routeing and tactical formations, and, wherever possible, stand-off missiles, as a means of surviving from enemy defences. It is arguable that this eventuality should be faced from the beginning of the mission, and that divergence to self-defence manoeuvring combat would be at best an irrelevance and at worst a disaster.

This article is not intended to cast any doubts on the value of the provision of active self-defence as a general principle. It is only the value of high manoeuvrability which is questioned. For example, equipping the close support aircraft with self-defence missiles which did not entail the aircraft diverging from its attack flight plan would undoubtedly reduce aircraft losses to enemy defences and could not be criticised by any of the arguments in the previous three paragraphs.

Overall, therefore, the argument for high manoeuvrability to provide an air-combat capability in close support aircraft does not seem strong and in particular is much weaker than the overriding need for a V/STOL or at least STOVL capability for survival on the ground, as demonstrated in the article in the April issue. Certainly it would make no sense to provide high manoeuvrability in close support aircraft if, as seems probable, increased costs in development and production were involved.

Conclusions

In order that close support aircraft may survive from enemy air defences,

(1) the aircraft must fly at 100 ft. or below at a speed of about 450-500 kt.

(2) tactical routeing, tactical formation flying, ECM, decoys and, where possible, stand-off missiles should be used.

(3) there is no overriding requirement for high manoeuvrability to provide an air-combat capability, certainly not at the expense of the mandatory V/STOL or STOVL capability, and certainly not if increased costs in development and production are involved.

Dear Sir...

Letters and photos of general interest are welcome and will be considered for publication—but they should be kept as short as possible. Will readers requiring acknowledgment of their letters please enclose a stamped addressed envelope.

Dornier Delphin

I was most interested in the article "Dornier's Dolphins" in your June 1980 issue but would like to suggest that the photograph of the Delphin III with the spurious registration D-IC at the bottom of page 230 is, in fact, D-1620 and not D-1857. The round windows identify the machine as the first Delphin III, *Werk Nr. 151* and of course D-1620 could easily be altered to D-IC on a photograph.

D-1620 is usually said to have been written off in June 1929, killing its pilot Georg Zinsmeier and four passengers, but this has been confused with the crash of Delphin II D-702. The later D-1620 actually served until 1936.

Although the article covered the history of the Delphin types quite comprehensively, I think the following additional information may be of interest to your readers.

The second Delphin I, *Werk Nr. 25,* was the machine operated for a short time by Ad Astra in 1921 with the Swiss registration CH-58. This company had decided to try modern equipment from Germany and apart from the Delphin, obtained for evaluation two Zeppelin-Lindau C III Komet monoplanes and a Junkers F 13 (as the Dornier Metallbauten G.m.b.H. was only formed in 1922 the early post-war landplanes and flying-boats designed by Dornier, strictly speaking were built under the name of the Zeppelin-Werke Lindau G.m.b.H.). Ad Astra soon returned one of the Komets and the Delphin to Lindau and it was not until 1924 that a purchaser for the latter was found in the Kawasaki Dockyard company.

Delphin I *Werk Nr. 26,* assembled at Marina di Pisa and with a 300-h.p. Isotta-Fraschini engine, had a larger cockpit to enable a mechanic to be seated on the left of the pilot and an experimental extension of the engine cowling over the cockpit to give partial cover for the crew. This is the machine shown in the left picture at the bottom of page 229, being photographed at the International Aero Exhibition at Gothenburg in Sweden in 1923.

The fourth Delphin I, *Werk Nr. 27,* was to have been assembled at Marina di Pisa also but in the event was returned to Seemos for rebuilding as a Delphin II in replacement of Delphin II *Werk Nr. 28.* The latter has crashed during trials for its potential purchaser, Deutsche Aero Lloyd and *Werk Nr. 27* was needed to enable testing of the new Delphin II type to continue (as the first of a possible batch of seven boats) but *Nr. 27* was itself destroyed in a crash at Lindau in the early summer of 1924 when being flown by Stroebel.

Werk Nr. 28 had originally been planned as a fifth Delphin I in 1922 but experience with the first Delphins led to an extensive redesign of the crew accommodation and the installation of the more powerful BMW IV engine. Given the new designation of Delphin II and registered as D 401, *Werk Nr. 28* was lost while being flown by *Flugkapitan* Aland of Deutsche Aero Lloyd.

The Dornier firm had already laid down a batch of three of the new Delphin II boats, however, in 1923 under *Werk Nr. 42, 43* and *44.* The first of these, *Werk Nr. 42,* was completed as D 277 in the summer of 1924 and after testing by Deutsche Aero Lloyd, was delivered to its associated company, Bodensee Aero Lloyd, in July 1925, together with *Werk Nr. 44* which had the registration D 702. The second of these two boats crashed in June 1929 but D 277 was only withdrawn from service at the end of 1932.

Although first built in 1928 as an intended successor to the Delphin II and planned as a series of six machines, with *Werk Nr. 151* to *156,* the Delphin III proved to have a relatively poor take-off performance and Bodensee Aero Lloyd expressed little interest in purchasing one, especially as its new parent concern, Luft Hansa, was rationalising all its operations. Even when Delphin I D 702 was lost in 1929 Luft Hansa could not afford to replace it by a Delphin III because of the economic conditions of the time. Eventually the seven-year-old Delphin I D 277 had to be withdrawn from service at the end of 1932 and only then did Lufthansa (now known by the single word) buy the ten-passenger Delphin III *Werk Nr. 151* which had been at the Dornier works since 1928. With the registration D 1620, *Werk Nr. 151* flew the Bodensee service for Lufthansa from 1933 to the end of 1936. This first Delphin III was the only one of the series to have round windows and had been repaired after a landing accident in June 1929.

Only two more Delphin III flying-boats were completed: *Werk Nr. 152* was CH-178 (and later D-1857) and *Werk Nr. 153* was never registered; both failed to find customers and were scrapped. The photograph at the top of page 230 in your June 1980 issue is of *Werk Nr. 153* which differed from *Werk Nr. 152* by not having small portholes above the pilot's front window.—*S. Bull, Petervale, South Africa.*

★ ★ ★

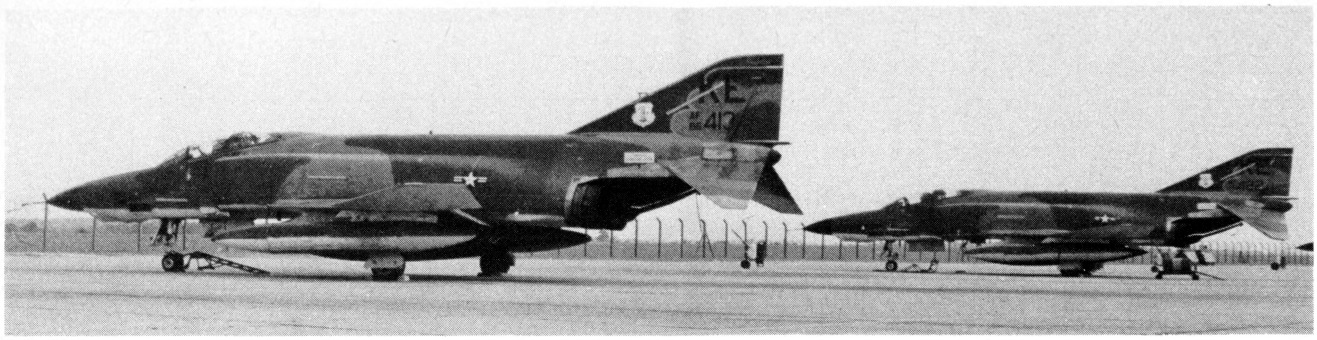
I found the article on the Dornier Delphin (June 1980 issue) most interesting but should like to point out that the Gs I flying-boat went to Ad Astra late in 1919, not early 1920. The aircraft left Switzerland on 10th December 1919 and was being demonstrated in Holland before the year was out.—*Gerard Terry, Ormesby, Cleveland.*

Photographed at Dübendorf by Werner Gysin-Aegerter, these Northrop F-5E Tiger IIs belong to the Swiss A.F.'s No. 18 Squadron of the Surveillance Wing which includes similarly equipped No. 11 Squadron. F-5Es are also in service with Nos. 8 and 19 Squadrons, flown by militia pilots. The Swiss have ordered 66 F-5Es and 6 F-5Fs

Warsaw Pact advantage

In dealing with the vital subject of eliminating enemy airfields, Malcolm English made one major omission in his otherwise admirable article in your October issue, entitled "Air Weapons —The Equalisers".

NATO airfields can indeed be put out of use and their aircraft immobilised by irreparably damaging or cratering their runways—and indeed the access tracks to them. Unfortunately the same does not apply to Warsaw Pact airfields. For a considerable period no tactical aircraft has been accepted into their inventory which does not have a



As reported last month (page 417), eight McDonnell Douglas RF-4C Phantoms of the U.S.A.F.'s 186th Tactical Recon. Group, Mississippi ANG, home-based at Key Field, Meridian, were deployed to R.A.F. Alconbury from 27th September to 12th October. Shown here are 66-413 and 66-422 bearing yellow-edged dark-green fin markings with "Mississippi" inscribed in yellow (Photo: Malcolm English)

rough-field operating capability; and the same will certainly apply to their future aircraft. Thus a Warsaw Pact aircraft attacking one of our airfields has only a limited objective to accomplish. By contrast a NATO attacker must effectively put out of action the whole airfield surface, a far more demanding task.

The widespread introduction of the General Dynamics F-16 and comparable aircraft into NATO will do nothing to improve this situation and restore the balance. There is surely an overwhelming case for our next generation of aircraft to have at least a rough-field, better still a V/STOL, capability—if we are given time to produce them.—*Air Chief Marshal Sir Christopher Foxley-Norris, G.C.B., D.S.O., O.B.E., M.A., F.B.I.M., F.R.S.A., R.A.F. (ret'd.), Henley-on-Thames, Oxon.*

DC-3s in Malta

Further to Joseph Mamo's letter on Malta in the July issue, page 270, the DC-3s N565 (c/n. 14955) and N535M (c/n. 20558) have both been used by Conoco (Continental Oil Company of Houston, Texas) for their oil exploration and drilling activities in Chad.

When the civil war broke out in Chad in early 1979 both DC-3s were moved to Cameroun, where they used the airfield of Maroua as their base of operations; I saw them there, several times during March and April 1979. After Conoco had to cease their operations in Chad, the DC-3s were apparently flown to Malta.

Other "refugees" at that time, at Garoua airport (also in North Cameroun), were Cessna F.150s TT-CAL and TT-CAN, and Piper PA-28 Cherokee TT-CAI.—*Hugo van de Garde, Hoofddorp, Holland.*

Vickers Valettas

Further to "Your Questions Answered" in the October 1980 issue, page 405, regarding the Vickers Valetta, I would like to add the following information on surviving aircraft:

The last flight of VX573 was the last flight of an *R.A.F.* Valetta. However, the A. & A.E.E.'s WJ491 continued to operate from Boscombe Down until at least the end of 1971 and was finally despatched to the fire dump at Gatow in mid-1972 (where I believe it still survives, although probably in very poor condition by now).

WJ476 left the No. 5 M.U. Apprentice School around 1974/5 after the school closed and the fuselage then appeared at the R.A.F. Fire School at Catterick where it expired around mid-1978.

WD159 was used for training at the Pontrilas Training Area, Ewyas Harold, Hereford, until blown up during a training exercise in December 1977; the wreckage, however, still remains.

VX572 has not been present at Manston for many years and probably expired at the Fire School there.

A couple of additional aircraft which survived until recently were VX527/7876M dumped at Weston-super-Mare and WJ462/8014M dumped at Topcliffe; both of these have now been virtually reduced to ashes.—*David J. Allport, Civil Editor, "Humberside Air Review", Cottingham, North Humberside.*

Photographic papers

I read with interest Mr. R. J. Ruffle's comments on resin-coated photographic papers in the October issue. He will find that most photographic laboratories and studios, having changed over to R.C. papers, have dispensed with most of the equipment (glazing machines, etc.) for producing bromide prints.

As you will notice in the classified advertisement section, I run a hand-printing and developing service for bromides and if I can be of any help to aviation enthusiasts in this matter, I shall be pleased to do so.—*G. D. Hodkinson, 190 Hampton Road West, Hanworth, Middlesex.*

FIDO history

As a local historian with a particular interest in aviation, I am compiling a detailed account of FIDO. As well as examining material at the I.W.M., P.R.O., etc., I very much wish to obtain the personal recollections of aviators who landed with the aid of FIDO during or after World War II, and of personnel who may have operated the system.

If any such would be good enough to write to me, I would be most grateful.—*Geoffrey Williams, 8 Meadow Road, Westbrook, Margate, Kent.*

Schiphol dates

Mr. Weihe says in the August issue, page 307, that he is inclined to think that the year is 1928. But I believe that the year at the earliest is 1929 because two of the F VII b-3m KLM aircraft on the movements board were registered *after* 3rd August 1928, namely 'EN on 10th September 1928 and 'EO on 29th September 1928.

The re-registration period from "H-N" to "PH-" for the Dutch civil aircraft register was 1st November 1928 to 31st January 1929 inclusive. Therefore the aircraft in question were registered PH-AEN and PH-AEO respectively after 1st February 1929.—*F. Demmenie, Amsterdam, Holland.*

Flying Tiger Lines McDonnell Douglas DC-8-63CF N791FT at Prestwick, 10th October. On the 1st of that month Flying Tigers, who previously had operated mainly in the U.S.A. and Pacific, acquired Seaboard World Airlines (Photo: Andrew Denholm)

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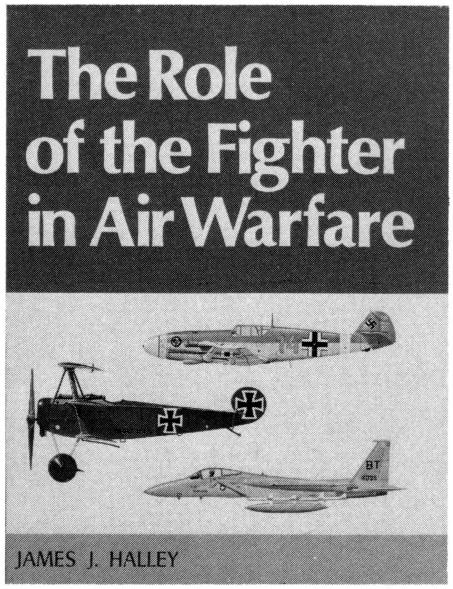

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Airlines of the World

by GÜNTER G. ENDRES

INTERFLUG

Photo above shows Interflug Tupolev Tu-134 DM-SCF at Helsinki in June 1971

Interflug (Flight code IF)

Interflug is the national airline of the German Democratic Republic and was founded in May 1954. Initially known as Deutsche Lufthansa, the airline adopted the present title on 1st September 1963.

Scheduled international services were inaugurated on 4th February 1956 between Berlin and Moscow using Soviet-built Ilyushin Il-14s, and these have since been expanded to serve 49 cities in 36 countries spanning four continents. The longest routes in its 125,000-km. network are Berlin–Maputo (11,500 km.), Berlin–Hanoi (10,300 km.) and Berlin–Havana (8,700 km.), flown with four-engined Ilyushin Il-62s. During 1979 Interflug carried around 1,250,000 passengers and almost 1,000 tonnes of cargo.

Domestic services were introduced on 16th June 1957 and have served at various times Dresden, Leipzig, Erfurt, Karl-Marx-Stadt, Barth/Ostsee and Heringsdorf until their withdrawal on 10th April 1980.

Apart from its world-wide network of passenger and cargo services, the airline is responsible for air taxi flights, aerial survey work, helicopter operations, crop-spraying and other agricultural activities through departments known as Bildflug and Agrarflug. Agricultural work was begun in 1957, and its Z-37 and PZL-106 Kruk aircraft and Kamov Ka-26 helicopters now service over 4,000,000 hectares annually, carrying out

Interflug Ilyushin Il-18D DM-STO (Photo: Geoffrey P. Jones)

One of the airline's nine Ilyushin Il-62s, DM-SEB, at Berlin-Schönefeld, its home base. Note Il-62's similarity to the VC10

pest control, fertilisation and seeding. Mil-8 helicopters are involved in construction, survey and coastal and inland patrol. All departments are also actively engaged in charter operations principally to and within other socialist countries.

Head Office: DDR-1189 Berlin-Schönefeld, Flughafen, German Democratic Republic. Telephone: 6720. Telex: 011 2892.

Reg'n.	*Type*	*c/n.*	*Remarks*
DM-SAL	VEB Ilyushin Il-14P	14.803.026	Calibration/training
DM-SCB	Tupolev Tu-134	0503	
DM-SCE	Tupolev Tu-134	0904	
DM-SCF	Tupolev Tu-134	0905	
DM-SCG	Tupolev Tu-134	0912	
DM-SCH	Tupolev Tu-134	0906	
DM-SCI	Tupolev Tu-134A	1903	
DM-SCK	Tupolev Tu-134A	1304	
DM-SCL	Tupolev Tu-134A	1305	Ex-East German A.F. 182
DM-SCN	Tupolev Tu-134A	2102	
DM-SCO	Tupolev Tu-134A	2103	
DM-SCP	Tupolev Tu-134A	2205	
DM-SCR	Tupolev Tu-134A	2206	VIP
DM-SCS	Tupolev Tu-134A	2207	
DM-SCT	Tupolev Tu-134A	08069	
DM-SCU	Tupolev Tu-134A	08070	
DM-SCV	Tupolev Tu-134A	12095	
DM-SCW	Tupolev Tu-134A	31218	
DM-SCX	Tupolev Tu-134A	48320	
DM-SCY	Tupolev Tu-134A	60495	
DM-SCZ	Tupolev Tu-134	0913	Ex DM-VBB/A.F. 177
DM-SDE	Tupolev Tu-134A	38040	VIP
DM-SDF	Tupolev Tu-134A	40150	VIP
DM-SDG	Tupolev Tu-134A	46155	VIP
DM-SDH	Tupolev Tu-134A	46300	VIP
DM-SDI	Tupolev Tu-134A	48560	VIP
DM-SDK	Tupolev Tu-134A	49900	VIP
DM-SDL	Tupolev Tu-134A	60108	VIP
DM-SDM	Tupolev Tu-134A	60435	VIP
DM-SDN	Tupolev Tu-134A	60612	VIP
DM-SDO	Tupolev Tu-134A		VIP
DM-SDP	Tupolev Tu-134A-1		
DM-SEB	Ilyushin Il-62	00704	
DM-SEC	Ilyushin Il-62	10903	
DM-SEF	Ilyushin Il-62	31402	
DM-SEG	Ilyushin Il-62	31403	
DM-SEH	Ilyushin Il-62	31405	
DM-SEI	Ilyushin Il-62	3036931	
DM-SEK	Ilyushin Il-62		VIP
DM-SEL	Ilyushin Il-62		VIP
DM-STA	Ilyushin Il-18V(D)	1905	
DM-STB	Ilyushin Il-18V(D)	2001	
DM-STC	Ilyushin Il-18V(D)	2202	
DM-STD	Ilyushin Il-18V(D)	2302	
DM-STE	Ilyushin Il-18V(D)	5101	
DM-STF	Ilyushin Il-18V(D)	7405	Ex CCCP-75553
DM-STG	Ilyushin Il-18V(D)	4402	
DM-STH	Ilyushin Il-18V(D)	7305	
DM-STI	Ilyushin Il-18V(D)	7601	
DM-STK	Ilyushin Il-18D	9302	
DM-STM	Ilyushin Il-18D	10805	
DM-STN	Ilyushin Il-18D	10903	
DM-STO	Ilyushin Il-18D	10904	
DM-STP	Ilyushin Il-18V(D)	7401	Ex DM-VAZ/A.F. 497

AGRICULTURAL AIRCRAFT

LET Z-37 Čmelak: DM-SFA to 'SFF; DM-SMA to 'SMI, 'SMK to 'SMZ; DM-SNA to 'SNI, 'SNK to 'SNZ; DM-SOA to 'SOI, 'SOK to 'SOZ; DM-SQA to 'SQI, 'SQK to SQZ; DM-SUX (Total 108 aircraft)
DM-SQL has c/n. 0908. The Z-37s are being withdrawn from use as PZL-106A Kruks are delivered
LET Z-37A Čmelak: DM-SLA to 'SLI, 'SLK to 'SLZ; DM-SRA to 'SRI, 'SRK to 'SRZ; DM-SSA to 'SSI, 'SSK to 'SSZ; DM-SVA to 'SVE; DM-SWA to 'SWI, 'SWK to 'SWN (93 aircraft)
PZL/Antonov An-2: DM-SKA, 'SKK, 'SKY
Mil Mi-8: DM-SPA (c/n. 0211), 'SPB (c/n. 0623), 'SPC, 'SPE, 'SPF
Kamov Ka-26: DM-SPG to 'SPU, 'SPV (c/n. 7303406), 'SPX to 'SPZ (18 aircraft)
PZL-106A Kruk; DM-TAA to 'TAI, 'TAK to 'TAZ; DM-TBA to 'TBH, 'TBI to 'TBM (37 aircraft)

DM-SPY is one of eighteen Kamov Ka-26s operated by Interflug

Czech-built LET Z-37 Čmelak agricultural aircraft DM-SMZ

EXERCISE "CR

by MARGARET McQUAILE*

EARLIER THIS autumn in Germany NATO tested its resources in Exercise "Crusader 80". It was the largest mobilisation of troops since World War II and certainly the most ambitious British exercise of its kind since the Alliance was formed.

As the tanks trundled along the roads of Lower Saxony, the Warsaw Pact was conducting its own manoeuvres behind closed doors and while its military strength remains substantially greater than that of NATO, the threat to Europe continues to grow.

Could the Allied Forces defeat an invasion launched by the Soviet Bloc with as little as 48 hours warning? "Crusader 80" was designed to answer this question. It would show up any weakness in logistics and equipment and would demonstrate whether or not reinforcements could be received in time. And as the "war" progressed, and "Oranges" forces broke across the River Leine, finally to be repelled by "Blue" (friendly) forces, it was clear that time was the most crucial element.

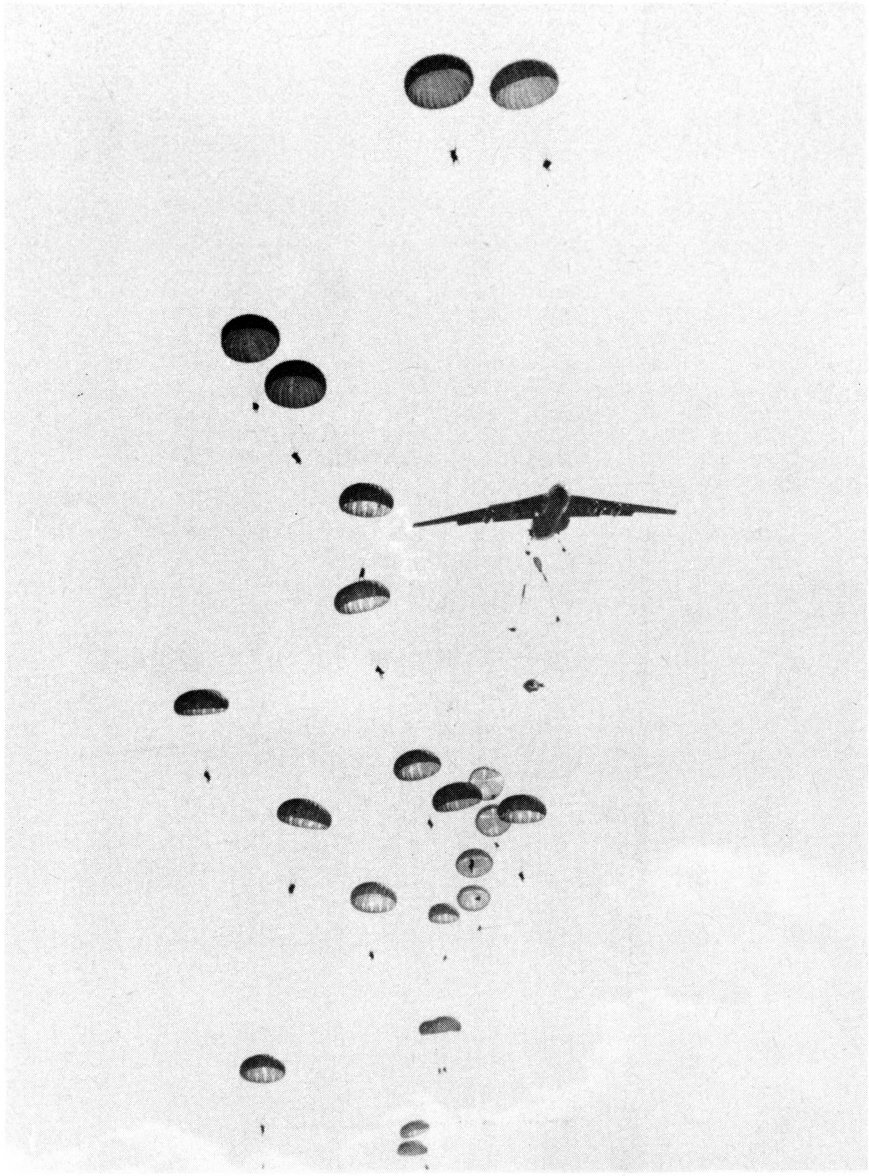
As the exercise was ending, the Commander of 1st British Corps, Lt. General Sir Peter Leng, commented: "Initially 'Orange' had massed against our front a huge superiority of tanks and had filled the sky above them with aircraft. He has in the period committed three airborne battalions, and he has taken every opportunity to land infantry from helicopters to force a breakthrough. Throughout the period, "Orange" special forces, partisans and saboteurs have attempted to disrupt our logistic and support troops."

"Ready—but only just"

Happily the "Blue" counter-attack was successful but the exercise had shown that "at the end of 48 hours the Aggressive Delay Force was ready—but only just". The 30,000 reinforcements from the U.K.—20,000 Territorials and 10,000 Regulars—had arrived on time. Deployment to battle positions went better than General Leng expected.

But much, he thought, depended on the politicians: "If we are to be fully ready to fight, within the time we expect to be allowed in the worst case, we must improve and refine our procedures further . . . but ultimately the time we have available for reinforcement is very much dependant on the political decision to allow that reinforcement to start. Time is critical".

Among other things the exercise highlighted the need for more tanks and guns, and "a marginal increase" of anti-



Above: *Paratroops of the U.S. Army's 82nd Airborne Division being dropped from a U.S.A.F. Lockheed C-141A StarLifter to reinforce the "Orange" forces. Ten C-141s were involved in this operation, drawn from the 437th MAW, Charleston AFB, South Carolina, and the 63rd MAW, Norton AFB, California*

Below: *Army Air Corps Westland/Aérospatiale Gazelle AH.1 XW999 setting off on a mission during "Spearpoint", the battle phase of the exercise*

* Margaret McQuaile is Assistant Editor of the Royal Aeronautical Society's magazine *Aerospace* and this article is based on a feature which she wrote for her own publication.

tank and anti-aircraft missiles. The Allied Air Forces representing "Orange" complained that they had not been tasked enough.

Air support

Air support for "Crusader 80" was provided by the 2nd Allied Tactical Air Force, which would be responsible for offensive and defensive air operations over Northern Germany, Belgium and Holland in the event of war, and by the 4th ATAF, responsible for operations in the South. The 2nd ATAF consists of R.A.F. Germany, units of the *Luftwaffe,* R. Netherlands A.F., Belgian A.F. and units of USAFE.

R.A.F. Germany flew more than 1,100 of the 2,700 sorties performed by 2nd ATAF during "Crusader". Peak activity for the R.A.F. was during the last fortnight of the exercise when it entered its active battle phase—"Exercise Spearpoint".

As "Orange" forces advanced westwards, R.A.F. Harriers, Jaguars, Phantoms and Buccaneers were in action. On Friday, 19th September, the entire R.A.F. Germany Harrier force, strengthened by No. 1 Squadron from Wittering, supported a massive "Orange" thrust of 400 tanks across the area between Peine and Braunschweig. For the "Break-in-Battle", R.A.F. Gütersloh launched forty Harriers, assembling them in 10 minutes and recovering them every 2 minutes.

Jaguars from R.A.F. Brüggen, reinforced by U.K.-based machines operating from R.A.F. Wildenrath, also provided close air support for the Chieftain tanks of the 4th (BR) Armoured Division and the M60s of the 2nd (US) Armoured Division ("Hell on Wheels").

The Royal Engineers provided a touch of realism with explosives to simulate anti-tank and anti-aircraft fire. As fighter aircraft screamed across the sky at low level and tanks hammered their way across the countryside, the flashes and noises seemed only too real. Mist unfortunately blurred the outline of the "Break-In Battle", and was to curb much of the air activity as "Spearpoint" progressed. The number of actual sorties which took place during this final two weeks was not as high as originally planned.

The day before, Thursday, 600 paratroopers of the U.S. Army's 82nd Airborne Division dropped at one-minute intervals from a height of 1,000 ft. from eight C-141A StarLifters of the USAF to join "Orange" forces. Two C-141Bs dropped vehicles and heavy stores. The drop was spectacular and was all the more remarkable in that the troops had flown directly on schedule from Pope AFB, North Bragg, South Carolina, with

Above: *U.S. Army Boeing-Vertol CH-47C Chinooks operating with the "Blue" forces transporting a Company group and some of their vehicles across a river*

Right: *U.S. Army Chinooks landing troops and vehicles at a secure LZ*

Below: *R.A.F. Harrier GR.3 of No. 4 Squadron, Gütersloh, operating from a dispersed site at Heimatoff in the Sennelager area. For "Crusader", Gütersloh's two Harrier squadrons were reinforced by No. 1 Squadron from Wittering (Author's photo)*

Main task of the R.A.F.'s Westland Wessex HC.2s was to move troops and supplies around the battlefield. Shown during a heliborne assault is one of the ten Wessex which No. 72 Squadron brought over from Odiham and operated in a wood near Steinheim. "Crusader" was the last major exercise for R.A.F. Germany's own Wessex squadron, No. 18, which has since returned to the U.K. and been replaced at Gütersloh by the Pumas of No. 230 Squadron

Exercise "Crusader" . . .

only a brief stop at Westover AFB, Massachussetts, for refuelling.

The "Operation Goodwood" battle on Tuesday, 23rd September saw "Blue" forces blunting the "Orange" advance. The usual morning mist prevented any pre-noon sorties, but "Blue" was now moving towards air superiority.

The "Blue" counter-attack got under way on Wednesday, the 24th—with R.A.F. Germany's entire Harrier force launched from Gütersloh in support. During the morning, "Orange" was supported by R.A.F. Jaguars and Buccaneers, along with American A-10s, German F-4s, F-104s and G-91s, and Dutch F-104s.

R.A.F. Gütersloh

Taken over from the *Luftwaffe* by the R.A.F in 1945, Gütersloh was one of the major terminal airfields during the Berlin Airlift. It provides terminal facilities for the U.K.-German weekly R.A.F. aero-medical evacuation flights and handles military and civil-charter transport aircraft moving personnel, dependants and equipment of 1st (BR) Corps whose H.Q. is at Bielefeld.

"Crusader 80" involved the largest joint military and civil airlift since the Berlin blockade of 1948–49. Before the exercise ended, Gütersloh handled 55 movements, involving 8,000 troops. In one 24-hour period 3,500 men were moved through the base. Facilities were specially uprated to handle wide-bodied jets and as part of a proving flight last year, a 747 was turned around in 45 minutes, a significant reduction on the normal commercial turnaround time. However, during "Crusader" a remarkable turnaround of a 747 was achieved in 19 minutes.

But perhaps most important, because Gütersloh is within 16 minutes flying time of East German "Floggers" (MiG-23s), the Station houses Nos. 3 and 4 (Harrier) Squadrons, No. 18 (Wessex) Squadron, and No. 63 Squadron, R.A.F. Regiment which defends the base with Rapier anti-aircraft missiles. The Wessex helicopters are now being replaced by Pumas of No. 230 Squadron, and Chinooks will be added to the strength in about 18 months time.

In the event of a NATO land battle it is unlikely that conventional runways would still be operational and the R.A.F.'s Harriers, with their ability to operate from woods and fields, could be the only tactical aircraft operating in the battle zone.

Gütersloh has 32 single-seat Harriers and four two-seaters. In wartime, these would be supplemented by another 12 aircraft. As mentioned previously, Gütersloh was reinforced by No. 1 Squadron's Harriers for the exercise.

On Friday, 12th September and Saturday 13th, convoys from Gütersloh moved into the field to set up six flying sites and three logistics parks.

For "Crusader", the air support exercise of which was titled "Cold Fire", the Harrier squadrons were tasked with reconnaissance, battlefield interdiction and close air support. They were somewhat disappointed with the amount of work they had been given, feeling they could have coped with a lot more.

No. 5 site at Heimatoff (which I visited) is grass with a tin strip for vertical landings. The aircraft are hidden in camouflaged hides which, in wartime, would be back in the trees. But with DM 12,000 to pay for every tree damaged, it is hardly surprising that even for Exercise "Crusader" the hides remained out in the open, but as near to the forest as possible.

Weapons used by the Harrier GR.3s include rockets, up to five cluster bombs, two 30-mm. Aden cannon, and a reconnaissance pod fitted under the fuselage. A 70-mm. oblique camera is carried in the nose and a HUD recording camera.

The versatility of the Harrier was effectively summed up by G/Capt. Mike Stear, Gütersloh's Station Commander: "If you can drive a Land Rover over it you can fly a Harrier off it".

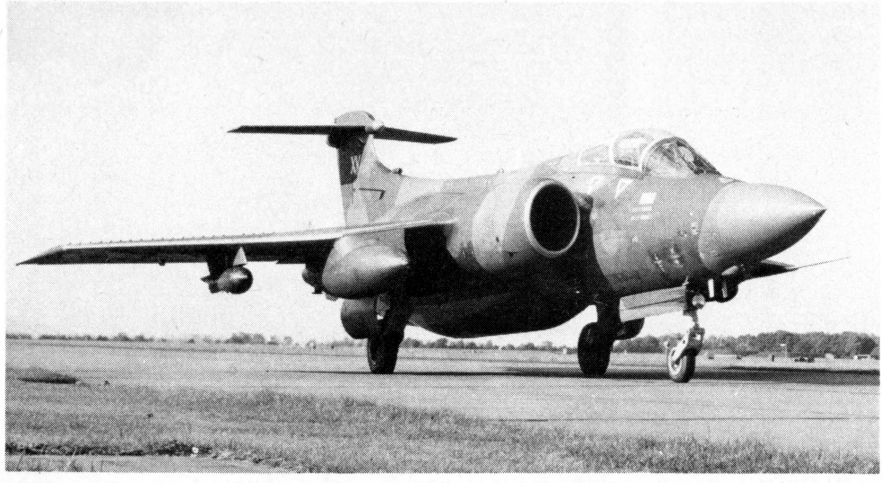
Army Air Corps

If the fixed-wing squadrons were disappointed with the amount of tasking allocated to them, the helicopter squadrons of the Army Air Corps certainly were not. Not only were A.A.C. helicopters flying in the reconnaissance role, and transporting troops and VIPs, they were also an anti-tank force with Helarm ("helicopters armed") sorties engaging "Orange's" tanks.

Each Army Division has an A.A.C. Regiment comprising two squadrons. BAOR controls five Regiments which are equipped with Gazelles, Lynx, and Scouts. The Gazelles are used mainly for liaison, observation and reconnaissance, while the Lynx and Scout are used in the anti-tank role.

During the next eighteen months the Scouts, which carry SS-11 missiles, will be replaced by Lynx, and ultimately each A.A.C. Regiment will have one

Operational again after the Buccaneer grounding earlier this year were Nos. 15 and 16 Squadrons at Laarbruch. Illustrated at its base is an S.2B of No. 15 Squadron



squadron of twelve Lynx and one squadron of twelve Gazelles.

For "Crusader", 2nd Regiment A.A.C. was reorganised into a squadron of six Lynx and six Scouts, and a squadron of twelve Gazelles. Normally 2nd Regiment's No. 652 Squadron at Bunde has six Scouts and six Gazelles, and No. 662 Squadron at Munster has six Lynx and six Gazelles.

The Lynx is extremely fast with a speed of up to 284 km./h. For the anti-tank role it carries three TOW missiles externally with additional missiles inside for rearming.

Many military advisers consider the helicopter too vulnerable to be used in the anti-tank role. However, as Colonel Peter Jones explained when I visited the H.Q. of 2nd Armoured Division in the field (in the forest would be more accurate): "If you are in a tank bumbling along with the odd shell coming over, then you are underneath the top and looking through optics and the chances of seeing a helicopter operating 2 kilometres away behind a bush are very, very slim".

The whole of R.A.F. Germany was committed to the exercise, including all five Jaguar squadrons which, it must be admitted, were not to be seen in pretty formations. This shot, staged earlier, does however illustrate a Jaguar from each unit (from the left): No. 2 Squadron, which is based at Laarbruch and specialises in reconnaissance; Nos. 14, 17, 20 and 31 Squadrons, which are all based at Bruggen and whose role is close support. Also taking part in "Crusader" were the Jaguars of No. 54 Squadron, over from Coltishall (Photo: Image in Industry)

Helarm sorties

Major Jim Ord's pilots from Nos. 652 and 662 Squadrons initiated about 45 Helarm sorties from their H.Q. at a farm near the village of Herkensen, 8 km. east of Hamelin and about 20 km. behind the FEBA. Only about twenty of these missions actually fired and in no instance were the aircraft seen by the enemy. I was flown in a Gazelle to a target point and even with binoculars I was unable to see a fire team as it took position against a dark green forest backdrop.

The main objective is to avoid being seen by the enemy and A.A.C. helicopters move around as close as possible to woodland and other natural means of cover. In open country the aircraft fly only a few feet above the ground, hopping over telegraph wires and often going under them.

The Helarm procedure is swift and efficient. A reconnaissance Gazelle may locate enemy tanks. He informs another pilot, known as the Director, who co-ordinates the operation. The Director selects fire positions and calls out a fire team to a terminal rendezvous point (TRV), briefing them en route. Second and third fire teams, each with four aircraft, move out at intervals.

The first fire team is called out from the TRV to take up fire positions. Once they have released their missiles, they fly back to the TRV and may rearm. The second and third fire teams move in in turn and this may go on indefinitely until all the missiles have been expended.

A Helarm attack may take as little as 25 minutes to initiate and complete. One particular mission was accomplished in an exceptional 11 minutes, the A.A.C. Regiment having had two fire sections hidden forward at a TRV and a third standing by at the Squadron Tactical H.Q.

The umpires were satisfied that none of the fire teams was ever spotted by their targets.

During the "Blue" counter-attack, six Lynx from 2nd Division, along with six borrowed from 1st Division, lifted infantry soldiers about 20 km. forward to launch a surprise attack at the end of a valley to take control of the route through it. The Lynx has a crew of two and can carry eight passengers.

One of the most effective things on a battlefield is a jet fighter, but it must be controlled and Army Air Corps helicopters are used to direct it from the air.

For example, in the forward battle area, a task force commander may ask for fighter ground-attack. Divisional H.Q. receives the request which is relayed to the Air Support Operations Centre (ASOC) at Corps H.Q. Divisional H.Q. is told the time on target. A helicopter gets airborne and gives orders to the fighter pilot who moves forward. The helicopter passes on to him any update of information, and also an identification point where he can begin to look for the enemy.

The exercise did not end without a few incidents. On 22nd September a British Army medical vehicle inadvertently crossed the unmarked inner German border near Vienenburg, became stuck in the mud, and was confiscated by the East German People's Army. And an Army Air Corps pilot spotted a farmer busily ploughing his field near Peine. He was not sowing winter wheat but using his plough to mark out in huge letters: "Russen raus aus Afghanistan + Deutschland".

Although tank-busting is more to its taste, this A.A.C. Westland Scout AH.1, XV122, was acting as "mail man" during "Spearpoint" and was marked with a white cross

Luftwaffe PR in World War II

Part 2: Interpretation; decline sets in; Allied assessment

by CHRISTOPHER R. ELLIOTT

REGARDING PHOTO-interpretation, and bearing in mind the *Luftwaffe*'s failure fully to understand the role of our radar stations at the time of the Battle of Britain, it is interesting to record how the Germans regarded "wireless transmitting stations". The 1945 Allied team noted:

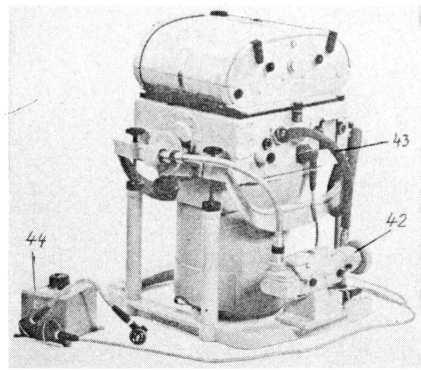
"In the introduction to this section it is stated that particular attention is to be paid to the recognition points of different types of W/T installations for the interpreter and to the correct identification of the most vulnerable parts. . . . The interpreter must take care to confine himself to things which he can clearly recognise and interpret. An exhaustive interpretation must be left to the technical specialist who alone has the necessary background . . .".

The 1945 team, as they talked to German PR experts and translated captured papers, felt a noticeable feature was the lack of comment expected from German photo-interpreters. This meant that obscure features in a photograph were often overlooked.

Basically, the trouble was that the status of German photo-interpreters was low. They were viewed as "persons who report but not as research workers who find or interpret". And on top of all that the German PR service had severe staff problems at the top of the tree.

Stiffer opposition

With the decline of superiority of German PR aircraft and the increased strength of British fighter opposition, photo-reconnaissance of the main British ports became impossible and had to be confined to the so-called invasion ports from the Wash round to Bristol. Even so, although high-altitude fighters were used, the efficiency of the British radar and fighter organisation meant that cover failed in many cases.



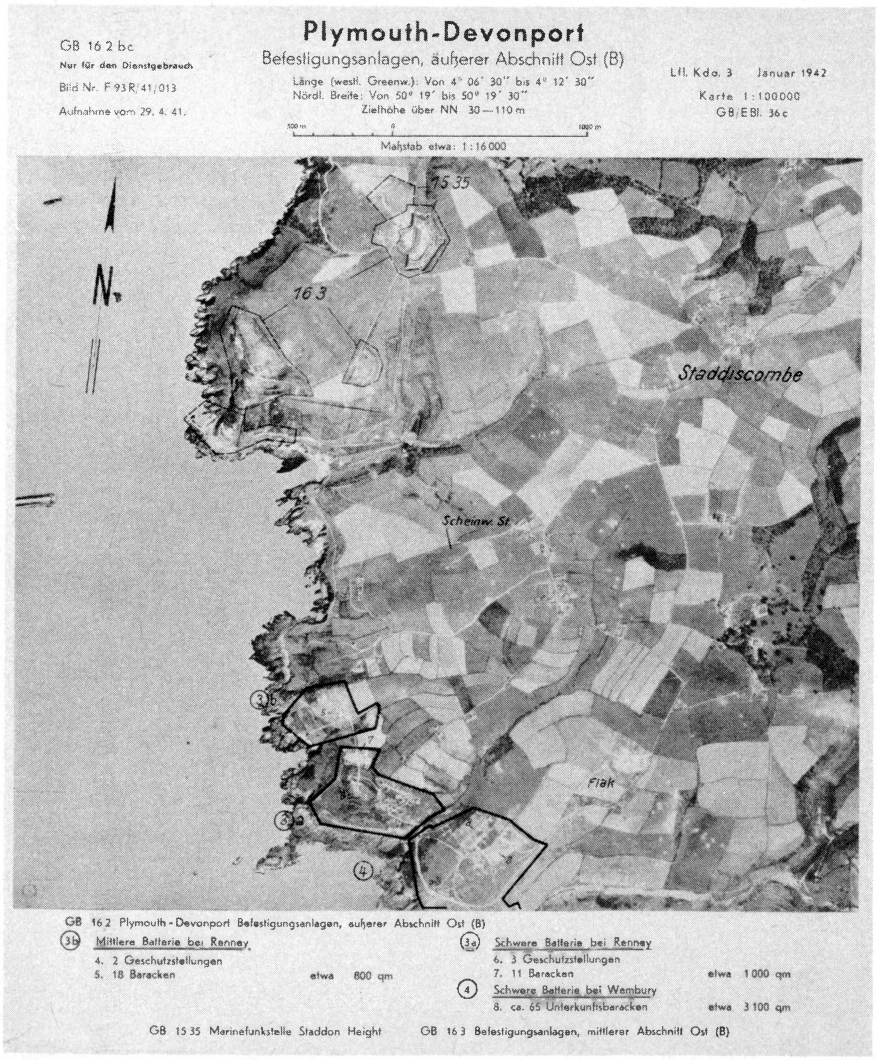
The German Rb 50/30 aerial camera

While cover of land objectives became ever more difficult for the *Luftwaffe* operating over Britain, a major commitment for shipping reconnaissance was the North Sea and the East Coast ports, the responsibility being that of the *Luftwaffe*'s forces in Norway and Holland. But as late as November 1944 Ju 88s and Ju 188s were still used for these purposes—but no cover of East Coast ports or coastal shipping was possible with these aircraft. Surprisingly, as late as January 1945, there still remained shipping reconnaissance squadrons equipped with the Arado Ar 196 and Blohm und Voss Bv 138.

It was hoped—but too late—to remedy this state of affairs by re-equipping shipping reconnaissance *Staffeln* with jet-propelled aircraft. In fact, a letter from the Air Officer for Reconnaissance dated 18th September 1944—as the battle for Arnhem was being fought—"dealt with the necessity of allocating Ar 234s or Do 335s for day and night reconnaissance of the sea area between the Thames and the Scheldt".

As the war progressed, it became clear that "the fundamental weakness of the German PR service lay in the failure to develop a fast high-altitude aircraft specifically for PR purposes".

Of the jet propelled aircraft, only the Arado Ar 234 and possibly the Messerschmitt Me 262 were used over the U.K. for long-range recce. That involved PR over areas south of the Thames, harbours between Harwich and Great Yarmouth and the sea areas between the Thames and the Scheldt. One particular use of some importance was the photography of the London area to estimate the effect of V-weapon attacks.


GB 16 2 bc
Nur für den Dienstgebrauch
Bild Nr. F 93 R/41/013
Aufnahme vom 29. 4. 41.
Plymouth-Devonport
Befestigungsanlagen, äußerer Abschnitt Ost (B)
Länge (westl. Greenw.): Von 4° 06' 30" bis 4° 12' 30"
Nördl. Breite: Von 50° 19' bis 50° 19' 30"
Zielhöhe über NN 30—110 m
Luftl. Kdo. 3 Januar 1942
Karte 1:100000
GB/EBl. 36c
Maßstab etwa: 1:16000
N.
75 35
16 3
Staddiscombe
Scheinw. St.
Flak
GB 16 2 Plymouth-Devonport Befestigungsanlagen, äußerer Abschnitt Ost (B)
3b Mittlere Batterie bei Renney
4. 2 Geschutzstellungen
5. 18 Baracken
etwa 800 qm
3a Schwere Batterie bei Renney
6. 3 Geschutzstellungen
7. 11 Baracken
etwa 1000 qm
4 Schwere Batterie bei Wembury
8. ca. 65 Unterkunftsbaracken
etwa 3100 qm
GB 15 35 Marinefunkstelle Staddon Height
GB 16 3 Befestigungsanlagen, mittlerer Abschnitt Ost (B)

As many as eight separate documents made up the German target folder for Plymouth-Devonport. This vertical photo taken on 29th April 1941, and issued in January 1942, shows many bomb craters in open country, well clear of marked objectives

While the R.A.F. made the most spectacular dam raid of W.W.II, attacking the Moehne, Eder and Sorpe reservoirs in May 1943, Luftwaffe *photo-reconnaissance aircraft were over the Elan dam feeding Birmingham on 17th September and 12th October 1940. In June 1943 a folder was issued for the Elan complex, including a section of the barrier wall. Some time before the R.A.F. dams raid folders of English dams were prepared but no German attacks were ever carried out*

Contrary to general thinking, the Germans did, in fact, keep a patchy watch on invasion ports. This was achieved by hit and run methods at high altitude in Me 109s, each aircraft frequently having only enough time to make a few hurried exposures over a port before turning for home. Ports not photographed by day were taken the following night using photo-flash bombs.

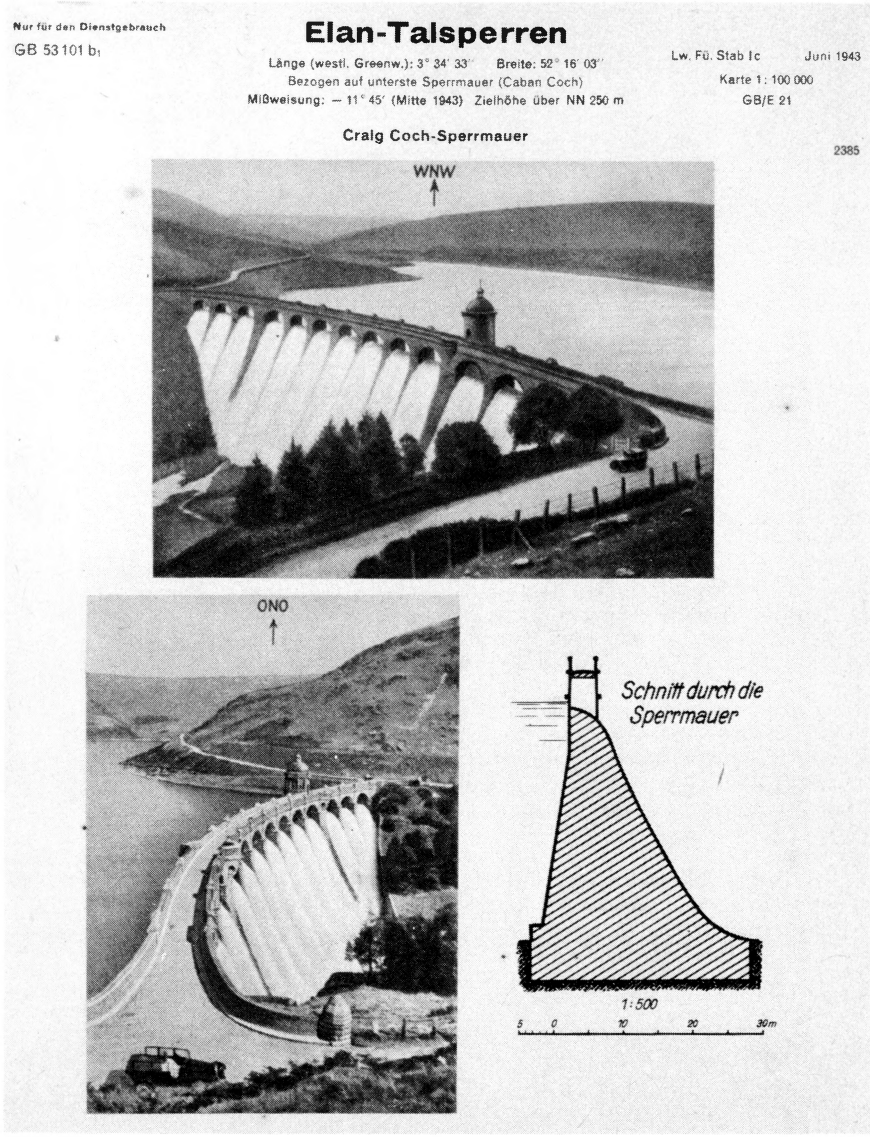
The 1945 investigators said of the *Luftwaffe*'s pre-D-day PR: "This pre-invasion reconnaissance of ports . . . did . . . produce results on which an estimate of the Allied intentions could be based. In May 1944, for instance, cover of 28 of the so-called invasion ports was obtained and although some ports were not photographed, the results were sufficient, together with other information, to enable the probable date of the invasion to be placed between June 4 and 11."

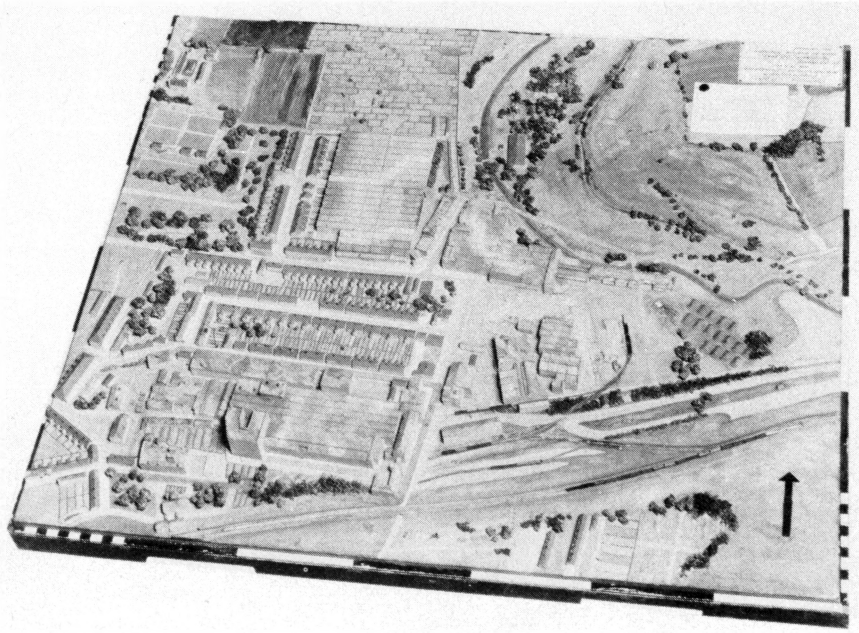
Main fault

The main fault with German PR cameras appeared to have been that they had been designed "primarily for survey purposes without reference to their installation in aircraft suitable for PR purposes".

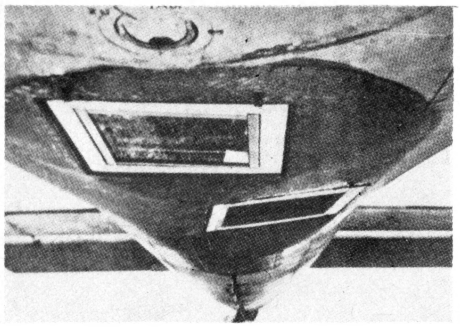
In the first place, the only camera capable of producing the results required for PR/PI purposes, the Rb 30 series, was heavy and bulky and aircraft like the Me 110, Me 410, Do 17, Do 217 and Ju 88D could carry only one such camera, in spite of the desirability of having a camera with an alternative focal length lens available. And the high-altitude Ju 86—a few of which operated over the U.K and in the Middle East—was the only aircraft which could accommodate two Rb 75/30 cameras. Thus it is clear why the pre-war but modified Ju 86 was sent into action over England in 1942.

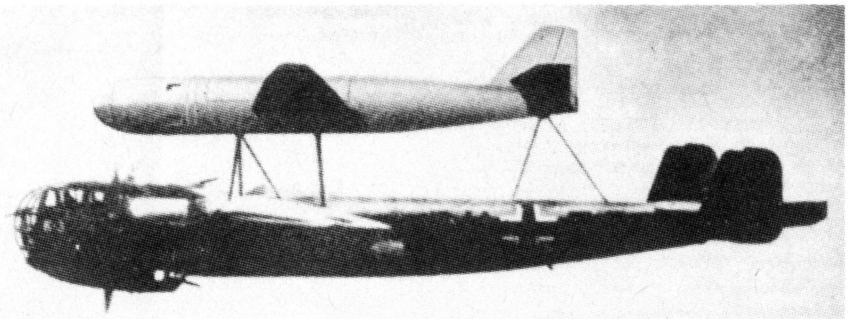
As far as short-range PR aircraft were concerned, considerable difficulties were met in fitting even one of the Rb 30





Luftwaffe *model of the Marconi works at Chelmsford, Essex, found by the R.A.F. at Quedlinburg airfield, Germany, in June 1945. The model was prepared on the basis of aerial photographs taken on 15th May 1943 but was not up to date. The Hoffman Manufacturing Co., whose factory premises were also depicted in the model, reported in 1967 that their four-storey administrative building and the whole of the ball and roller lapping departments were missing. The reason for the omissions was that when the* Luftwaffe *bombed the factory on 19th July 1942, they thought that they had inflicted heavy damage, whereas it was slight*





Left: *Ventral camera ports of a Junkers Ju 86P high-altitude reconnaissance aircraft.* Right: *Among the advanced reconnaissance projects developed by the Germans was the DFS 228 rocket-powered glider which, carried on the back of a Dornier Do 217 for the first stage of its flight, was expected to reach a height of 75,000 ft. It did not enter operational service*

Luftwaffe PR . . .

series in a single-engined fighter. So this meant that it was necessary to fly sorties by pairs of aircraft if cover of two different scales was required.

The Germans paid little or no attention to the needs for long-term strategical intelligence, such as was built up over a period of years by the Allied Central Interpretation Unit. *Luftwaffe* coverage of such features as industrial installations was fundamentally for target purposes and "one good cover" was considered sufficient until the target was attacked, when damage assessment photographs were taken.

For example, *Oberst* Bauer, an officer on the staff of the Air Officer for Recce., stated that "the German staffs were badly misinformed on the strength of the R.A.F. when preparing the 1940 attack", a fact which he attributed to lack of systematic photo coverage.

Assessment lax

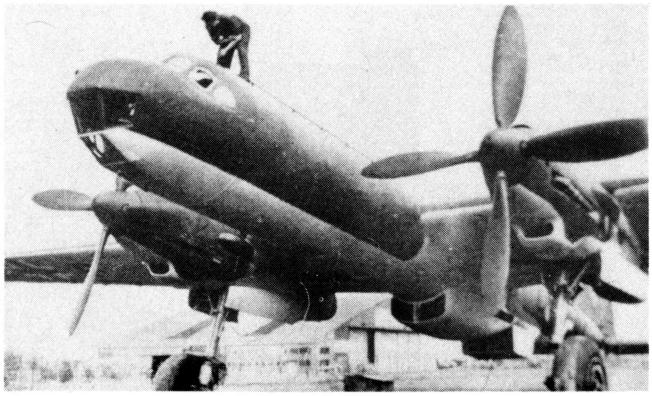
The *Luftwaffe*'s assessment of U.K. airfields and their aircraft was lax. No attempt, it appears, was made to assess the activity of the British aircraft industry; nor was it possible to maintain a regular coverage of airfields in Britain in 1941. On the other hand, attention was continually drawn by the Germans to the excellence of British airfield camouflage, especially in the early days before concrete runways were built.

When an enemy agent was dropped by parachute near Ely, Cambridgeshire, in December 1942 to sabotage the de Havilland factory at Hatfield, about to produce the Mosquito bomber, the Germans were bluffed.

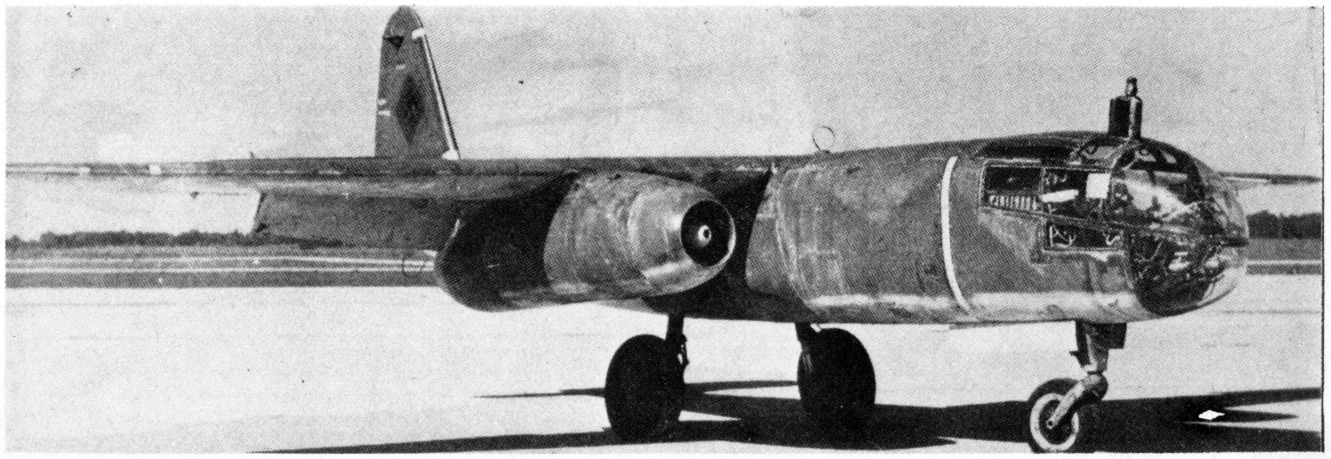
After an illusionist, employed by the British Secret Service, had blown out part of the factory roof and let off smoke bombs, "a German reconnaissance aircraft . . . was allowed to enter the airspace over the factory to photograph what looked like a considerable explosion".

Meteorological reports were important to all three German Services, and the regular passage of *Luftwaffe* met. aircraft, which sometimes did photography at the same time, was sometimes controlled (given safe passage) over the U.K. as the information they transmitted back to their bases often gave the British defenders an idea of what might follow in the way of bombing raids. If this was allowed on a wider scale than so far detected in official records, it must have given the decoy men, who were particularly active along the East Coast, many opportunities further to confuse the *Luftwaffe* on ground targets.

Bearing in mind that some of the German target folders in my possession were prepared well before September 1939, it is surprising that only a few have inked-in amendments and pasted slips, mostly giving the target numbers and names of airfields within striking distance of the main objective. In one or two cases the format of the briefing sheets was altered for, I dare say, easier



Left: *The Henschel Hs 130 which carried two Rb 75/30 cameras and was intended to operate at 50,000 ft. The project failed*
Below: *Much more successful was the jet-propelled Arado Ar 234 which carried out a number of reconnaissance flights along the East Coast of Britain in late 1944 and early 1945. It was hoped that the Ar 234s might also report on V-weapon damage*



handling. But the essential presentation remained unchanged for the whole of W.W.II.

The difference in *Luftwaffe* and R.A.F. output of photo-recce. pictures is clearly shown when it is recalled that a fully mobile photographic section working for the Desert Air Force and the 8th Army had to limit production of prints to 20,000 a day, "more than the average monthly output of the staff of PR/PI section of *Luftflotte 3*", owing to a shortage of printing paper in the summer of 1944. The ability of the Allied Air Forces to produce prints was, unlike the *Luftwaffe* effort, supported by advanced mechancial processing and printing equipment.

The plight of the *Luftwaffe* as D-day loomed to obtain adequate photo coverage was illustrated in May 1944 when a talkative German airman prisoner disclosed that a Republic P-47 Thunderbolt, repaired after a wheels-down landing in the Cherbourg area, had joined the strength of *3.(F)/121* at Bernay. It was hoped by subterfuge to succeed in obtaining photographs of inland objectives in the U.K. The P-47's original camouflage was maintained but German markings were added "to keep the pilot, *Oberfeldwebel* Hans Schaefer, within the law in case he was taken prisoner". Whether the P-47 ever operated over Bristol, its intended beat, is not clear.

Few clear days

So it is a wonder that the *Luftwaffe* managed to photograph and record what it did. But domestic problems were not the only drawback so far as photographing the U.K. was concerned: in W.W.II the British Isles was fully clear for high-altitude photo-reconnaissance "only about 35 days a year", thereby adding considerably to the difficulty of obtaining photographic cover.

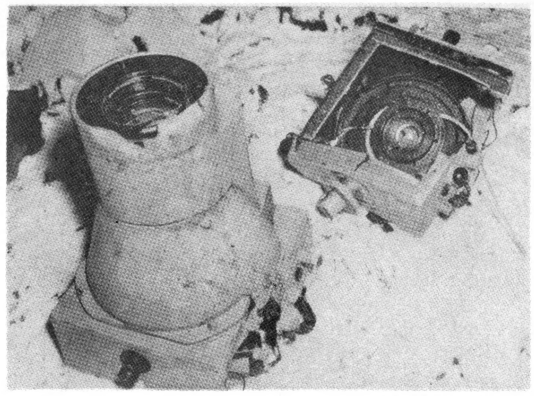
Now aerial photography has changed to satellite scanning of huge areas of the earth as the photograph taken on 29th May 1978 by Dundee University tracking station shows. Gone are the days of wallowing at 40,000 ft. plus in order to bring back, if at all, a handful of aerial pictures of, in comparison, a pinhead of detail.

In his edited study entitled *The Uses of Air Photography*, published in 1977, Mr. J. K. S. St. Joseph, Professor of Aerial Photographic Studies and Director in Aerial Photography in the University of Cambridge, noting that the land surface of the U.K. and Ireland was unusually favourable for survey and reconnaissance work, said: "It includes a greater range and diversity of geographical and geological features and processes than almost any other part of the earth's surface of comparable size. This diversity is reflected in a wide range of soils supporting correspondingly varied vegetation. . . ."

Some odd aspects of U.K. terrain came under the scrutiny of German PR. The *Daily Mail* for 1st May 1967, in an article on the decline of Britain's hedgerows, noted: "Curiously, the only comprehensive map of British hedges was made by a *Luftwaffe* pilot named W. Hartke doing aerial reconnaissance during the war. He is officially credited in scientific papers on the subject."

Ultimately it was to Austria that the *Luftwaffe* High Command withdrew in the early days of May 1945. Other German Air Force parties were scattered around the neighbouring countryside "where large quantities of their surviving documents and records were dispersed and concealed".

The end



U.S.A.A.F. photo published in 1943 of camera equipment found in a Junkers Ju 88A-1 reconnaissance plane brought down over Iceland. Contrary to a report made in 1945, this particular Ju 88 was capable of carrying two cameras—one with a 12-in. focal length and the other with a wide-angle lens—but it was noted that the "camera equipment occupied the entire bomb bay"

Britain at a glance. This remarkable picture was received by Dundee University satellite tracking station at about 10.30 B.S.T. on 29th May 1978—quite beyond the dreams of aerial photographers, on both sides, in World War II

Christmas Bookshelf

Aircraft Illustrated Annual 1981
edited by Martin Horseman (Ian Allan, £3.95)
Annuals used to appear about a month or six weeks before the year for which they were designated (normally to catch the Christmas trade) but nowadays the date seems to bear little relation to the publication date. This hardy annual reappears in its same style and makes a very pleasing collection of articles on diverse aeronautical subjects, from museum collections to wartime experiences, from present-day military flying to serious historical articles on World War I aviation. There is something of joy for all in this well-produced book.—*J.D.R.R.*

Military Wings
by Brendon Deere (MS Marketing, available from Specialist Books & Models, 7 Eldorado Road, Cheltenham, Gloucs., £3.65 plus 30p postage)
Comparatively little gets into print about the aircraft of the Royal New Zealand Air Force. This book endeavours to remedy this omission in part by featuring nine of the R.N.Z.A.F.'s most important aircraft—Canberra, Corsair, Dakota, Kittyhawk, Mosquito, Mustang, Skyhawk, Sunderland and Vampire. Each type is given a couple of pages of text describing it and its particular place in R.N.Z.A.F. history, then follow pages of photographs of the type in service, many of which will be completely new to readers in Britain. They have been well chosen to give a varied picture and the whole results in a pleasing book.—*J.D.R.R.*

Flashing Blades over the Sea
by Lt. Cdr. J. M. Milne, R.N. (Maritime Books, Duloe, Liskeard, Cornwall PL14 4PX, £1.80)
The swashbuckling title belies the serious content of this interesting soft-back which traces the development of the helicopter in Royal Navy service authoritatively and comprehensively. Nothing of importance has been left out and the story comes across in an interesting manner. Particularly valuable are the illustrations; many photographs, both black and white and in colour, a high proportion of which are new and some very unusual. No one interested in the Fleet Air Arm or in helicopters should miss this book! How, in these days, so much of interest has been produced for only £1.80 one just doesn't know.—*J.D.R.R.*

Stuka at War
by Peter C. Smith (Ian Allan, £7.95)
The 1971 edition had 157 photos and was library shelf-size; the 1980 edition has the 128-page large-format design which Ian Allan seems to favour these days. In addition to many of the original photographs, the content has been increased to 218 photos and the text has been modestly enlarged to incorporate some more recently acquired material. Some of the errors of the original edition have been excised. —*C.W.C.*

The Luftwaffe in the Battle of Britain
by Armand van Ishoven (Ian Allan, £7.95)
What was it like to fly the Heinkel He 111 and the Junkers Ju 88 . . . to be with the Messerschmitt Bf 109s and Bf 110s . . . to engage in photo-recce. over Britain, to dive-bomb the RDF (radar) stations, to dodge the balloon barrages, and to limp back to France severely battle-damaged? In 128 large-format well-illustrated pages, Armand van Ishoven once again will please those who know of his skilful writing and expert touch with informative captions to well-selected photographs.

For any newcomer to the subject of the *Luftwaffe*'s assault against Britain in 1940, this new book is an essential starting point. The emphasis is on what men did and how they did it; which is excellent because there are plenty of books available devoted solely to the aircraft of the *Luftwaffe*. This is not a book glorifying war but rather a series of reflections on how it was by someone old enough to dedicate the book to his own children: "May they never know the horrors of war."—*C.W.C.*

Raymond Baxter's Farnborough Commentary
by Raymond Baxter (Patrick Stephens, £6.95)
For more years than perhaps he cares to remember Raymond Baxter has spent the S.B.A.C. Show in getting over the flavour of its uniqueness to a vast listening and viewing public. Now he has gone into print, recalling Farnborough's past, backed up by many illustrations. This is not just a catalogue of aircraft and names but it has punched into it Baxter's own thoughts, comments and descriptions and includes his views on trying to record from the two-seat Harrier while doing the ski-jump and similar activities. The resulting book manages to capture the changing atmosphere of Farnborough down the years and most of us, the "regulars", will nod in agreement and pleasure as we read through it or say "Well now I never knew that!" about some aircraft or happening. It is authentic Baxter, authentic Farnborough, authentic commentary.—*J.D.R.R.*

War Winners
by Ronald Clark (Sidgwick & Jackson, £7.95)
Selected from many books, detailed in the bibliography, this 154-page compilation is in a way a mish-mash of incendiary bullets, Enigma machines, sawdust and ice aircraft-carriers, nerve gases and laser beams. So although it is about weaponry in the main, there are descriptions and photographs of airborne radar like H_2S and Lancasters dropping "window", Mosquitoes bouncing bombs, Skyhawks firing air-to-surface missiles, flying bombs, V-2 rockets, "Enola Gay" and so on.

Not an aviation book by any means, but including a lot about air warfare, *War Winners* charts a course from synchronising machine-guns in a Fokker E I in W.W.I via kamikaze pilots in W.W.II, to the psychological brain-washing mind-bending techniques of today.—*G.J.P.*

Wings across the world. An Illustrated History of British Airways
by Harald Penrose (Cassell, £9.95)
Twenty-six by 19 cm., 304 pages, 19 colour photographs, 140 black and white photographs, 49 coloured side views of transport aircraft, 10 coloured maps and numerous colour reproductions of posters and advertising material including cut-away drawings of the C class flying-boat and a Frobisher. This

Christmas Greetings to all our Readers

A. & A.E.E. Westland Whirlwind XD164 dressed in seasonal camouflage for a children's party on 21st December 1954 (Photo: Henry Wills)

range of illustrations, together with Harald Penrose's text tracing the whole history of British air transport, mostly in chapters covering five years at a time, must be a valuable record of a significant segment of British aviation and it would be nice to give this work wholehearted and unstinted praise —for it is a monumental undertaking. Regrettably it contains too many errors, some careless proofreading and some bad layout such as unnecessarily taking photographs across the centre folds.

The book is certainly valuable and gives a good picture of the first 60 years of British air transport, but the reader must be careful. For example, the first collision between two civil transports is properly recorded on page 31 as involving the D.H.18 G-EAWO but on page 43 we are told that the British aircraft was D.H.34 G-EBBQ; the double spread of the Mark II Argosy G-AACH "City of Edinburgh" is described as "The *City of Birmingham,* the first Argosy Mk.I to be delivered to Imperial Airways." The Mk.I and II were easily distinguishable and the "City of Birmingham" was registered G-EBLO. We are also given the surprising information that " . . . the new Boeing 307 Stratoliner had crashed through explosive decompression . . ." In fact the Stratoliner's elevator control was too light and on recovering from a stall overcontrol led to the loss of the wingtips, resulting in a flat spin.—*J.S.*

The Engines were Rolls-Royce
by Ronald W. Harker (Collier Macmillan, £7.95)
Ronnie Harker joined Rolls-Royce as a premium apprentice in 1925; some 45 years later he parted company in 1971 when Rolls-Royce was in the throes of bankruptcy. During those four-and-a-half decades, the author of this informal history of that famous company served R-R successively as test pilot, export sales manager and, lastly, as military aviation adviser. He tells his story with great charm and no rancour; he admires style in people, companies, cars and aircraft. This must have appealed, too, to the important American book people, Macmillan Publishing Co. of New York. They read his *Rolls-Royce From The Wings* (Oxford Illustrated Press, 1976) and asked for an expanded version with many different photos. A delightful read.—*C.W.C.*

The Jet Age
edited by Walter J. Boyne & Donald S. Lopez (Smithsonian Institution Press, $17.50)
Sub-titled "Forty years of Jet Aviation", this 190-page book is also available in paperback at $7.95. It is nice to have a Concorde on the cover of an American book, and a selective bibliography and research guide (of five pages) in any book.

The three sections on Jet Fighters, Jet Bombers, and Jet Airliners are all photographic and one forgets until one sees these parades how strange some of the aircraft looked then, and how peculiar they seem to us now. These inserts are not, unfortunately, comprehensive but selective.

Sir Frank Whittle, now with the U.S. Naval Academy, contributes the first chapter on the birth of the jet engine in Britain and among the other five major contributors is Charles E. Yeager discoursing on flying jet aircraft and the Bell XS-1 in particular. There are lots of photos and diagrams but no index.—*G.J.P.*

Aircraft of the Battle of Britain
by William Green (Jane's, £1.95)
Sixty-four pages ("landscape"), 65 black and white photos, 10 line 3-views and 21 black and white artwork side views—all related to the Hurricane, Spitfire, Defiant and fighter Blenheim as "The Defenders" and the Bf 109 and Bf 110, the Ju 87 and Ju 88, the He 111 and the Dornier Do 17/215 as "The Attackers". Perhaps one's enthusiasm for this modest effort (first published in 1969) is tempered by the card-cover artwork . . . positively the worst interpreted "warming-up" sketch of a Hurricane seen for many a Battle of Britain Day!—*C.W.C.*

Aircraft v. Submarine
by Alfred Price (Jane's, £8.95)
When first published in 1973 (by Wm. Kimber), this book quickly became essential reading for all concerned with the subject. This updated and revised 1980 edition is therefore a welcome addition to the military library because Alfred Price writes convincingly and entertainingly. The only criticism is that the period 1945–80 for the basic theme of "the evolution of the anti-submarine aircraft" is compressed into the final chapter of 20 pages out of a main text total of over 250 pages.—*C.W.C.*

The Flight of the Mew Gull
by Alex Henshaw (John Murray, £9.50)
The wartime part of Alex Henshaw's life story, covering his career as Chief Test Pilot at the Castle Bromwich Spitfire factory, was told in his recently published *Sigh for a Merlin.* This new book is the enthralling account of racing and record-breaking during the golden age of civil flying before World War II. It describes Henshaw's determination to win flying's Blue Riband, the King's Cup Race, and how he developed racing techniques which extracted the last ounce of performance from his Comper Swift G-ACGL and later from Leopard Moth G-ACLO.

He also developed a natural aptitude for instrument flying and an obsession for making accurate landfalls at long range, and in April 1937 acquired Percival Mew Gull G-AEXF which, in 1980, is still happily with us in rebuilt form.

The King's Cup fell to 'XF in 1938 after which, in collaboration with Jack

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Christmas Bookshelf . . .

Cross of Essex Aero Ltd., Gravesend, the aircraft was progressively and dramatically modified for the successful, and still unbeaten, 12,754-mile out-and-home Cape record in February 1939. The author's graphic description of this flight in airman's language creates an almost unbearable tension as each nail-biting chapter unfolds. Today it seems scarcely possible that any man could sit isolated in the cramped cockpit of a small racing aircraft over mountain and desert for nearly 40 hours, every minute of which taxed his flying and navigational skills. We can but marvel and give thanks that despite complete mental and physical exhaustion, he was able to make a safe return landing at Gravesend.

The author pays continual tribute to his father's unstinting support beginning with an early chapter which lifts the curtain, for all too brief a moment, of carefree days at M.D.L. Scott's flying club at Skegness where he learned to fly on Gipsy Moth G-AAKM. It has a delightful whiff of Spartans, Bluebirds and penniless aviators before the delivery of his own Moth G-AALN.—*A.J.J.*

Battle of Britain
by Len Deighton (Jonathan Cape, £8.50)
This lavishly illustrated guide to the Battle of Britain has a best-selling forebear in the more recent *Fighter* (J. Cape, 1977) which was saddled with the immodest sub-title of "The True Story of the Battle of Britain".

In *Battle of Britain* we have some of the best ingredients to ensure immediate purchase by the vast, uncommitted, readership of the impulse buyer: arresting dust jacket design of a downed Dornier Do 17 (and the author's name in red twice as big as the title in black); Adrian Field's most pleasant book design; short *Reader's Digest*-style features on such complex subjects as radar, guns and air technology; a day-by-day battle diary; and, not least, nearly 300 illustrations. There are no complaints about the quality of photo reproduction and every piece of artwork is original, from full-colour maps to aircraft cutaway perspectives. One has a feeling that many of the dyed-in-the-wool students of the Battle of Britain may join the queue of impulse buyers; the pictorial content is most seductive. —*C.W.C.*

Flying and Ballooning from old photographs
by John Fabb (Batsford, £6.95)
It is difficult to know what to write about this book. For the most part it consists of more than 100 black and white photographs, one or two on a page plus some double spreads, and most are extremely interesting, covering kites, balloons, airships and early aeroplanes. There is a three-page introduction and each picture has a very short caption and it is here that the book comes to grief. Farnborough and Aldershot are used as alternative names for the same place, the "Nulli Secundus" is given two first-flight dates, and Gustav Hamel, Lt.-Col. (later Maj.-Gen. Sir J. E.) Capper, and Mrs. Maurice Hewlett are among those whose names have been wrongly spelled, and Claude Grahame-White has lost his hyphen.

However, the pictures are interesting although one of the best has nothing aeronautical in sight—it is a double-spread of policemen eating their sandwiches and taking a drink beside a Mann, Crossman & Paulin waggon at Hendon in July 1911. We have long noted the aviation enthusiasm of some dogs, so it is good to find included a photograph of a Cody biplane with a cat posing proudly in the foreground.—*J.S.*

Spitfire in Action
by Jerry Scutts (Squadron/Signal Publications, available from Arms & Armour Press, £2.50)
The now well-established American series of contemporary and W.W.II combat aircraft albums offers a pleasantly balanced collection of 112 black and white photos of the Spitfire/Seafire family from Mk.1–47. Whereas the 3-view and comparative line side views and "bits & pieces" drawings do not inspire total confidence, American artist Don Greer's centre-spread of 10 full-colour side and perspective views (two more on the back cover; plus panoramic front cover) successfully rival anything so far attempted by his British counterparts.

The author's introductory pieces for the different variants and above-average caption-writing are worthy of praise, for it is no easy task to present even a basic development history of such a classic fighter as the Spitfire/Seafire in 58 large-format pages.—*C.W.C.*

A Directory of British Military Aviation and US Military Aviation in Europe
by Paul S. Mercer (Jackson Publications, 36 Moat Road, Loughborough, Leics. LE11 3PN, £4.00)
It seems that the flood gates are now open as regards publishing up-to-date information about military aviation. Following on the heels of Peter March's *Military Aircraft Serials* and BARG's *British Military Aircraft Serials and Markings,* we have this book which goes even further into detail.

It is divided into four sections. The first, "Units", describes the location and equipment of every R.A.F., Army, F.A.A., M.o.D. (P.E.), U.S.A.F. and U.S. Army unit in Europe and the R.A.F. and Army ones beyond. Section Two is entitled "Installations" and lists all the airfields and the units and equipment based there. Section Three covers "Aircraft" and gives all the serial blocks plus a list of aircraft serial numbers adding the unit to which each aircraft belongs and its identity markings—except for some front-line types. Section Four is, in effect, an appendix covering abbreviations. Of course, such information is only up-to-date at the time of compilation, but this book goes much further than any previous publication in providing a current census of British and U.S. military aircraft in Europe. It should cause quite a redundancy in the Soviet spy world.—*J.D.R.R.*

Warneford V.C.
by Mary Gibson (Fleet Air Arm Museum, £3.75)
This is the first book published by the F.A.A. Museum, and is obtainable from it, at R.N.A.S. Yeovilton. In a foreword Admiral of the Fleet Sir Caspar John, himself a carrier pilot of no mean distinction, recalls the fact that Warneford won his V.C. by destroying a Zeppelin, the *LZ-37*, the first such achievement ever. The book, written by a cousin of the V.C., recounts his early life in India and reveals a good deal of his character.

Quite apart from the story of the all too short life of this remarkable and heroic pilot, there are photographs and details of his initial flying training, and of his service with No. 1 Wing, R.N.A.S., at St. Pol aerodrome. A fascinating group photograph shows men who later became senior officers in the yet to be created R.A.F.: Evill, Bigsworth and Longmore. Had he lived, very likely Sub.-Lt. Warneford would have joined them in the new Service, and further increased the debt of gratitude which the R.A.F. must always feel towards its two ancestors, the R.N.A.S. and R.F.C. But this was not to be, for on 17th June 1917 Warneford was killed in a flying accident in a Henry Farman F.27 which he was to deliver back to the R.N.A.S. at Dunkirk, after collecting it from Buc outside Paris. The aircraft went out of control and broke up in the air.

The book is beautifully written, produced on good quality glossy paper and cheap at £3.75. It is worth reading, not only for its biography of Warneford V.C., but for the thought-provoking questions which it raises, and which can now never be answered.—*G.J.C.P.*

Target England
by Derek Wood (Jane's, £8.95)
Sub-titled "The Illustrated History of the Battle of Britain", for those who have been around long enough this is the picture-book version of the illustrated version of the highly successful day-by-day account of the Battle of Britain, *The Narrow Margin* (Hutchinson, 1961). With such a pedigree, need more be said than that the pictures (nearly 400 of them, old favourites and new ones) are excellently printed! —*C.W.C.*

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JANE'S

We wish to apologise to the readership of Air Pictorial for the misleading information in our advertisement for LUFTWAFFE TEST PILOT which appeared in the October issue. This advertisement should have read 158 pages of text plus 48 pages of photographs and not 272 pages as stated.

JANE'S Publishing Company Ltd

HS 125 Fly-in

by JOHN C. COOK

THE BRITISH Aerospace factory at Chester was the location for a fly-in of HS 125s which took place on 29th October celebrating the sale of the 500th aircraft, which has been purchased by Manufacturers Hanover Corporation, the fourth largest bank in the U.S.A. British Aerospace's Chairman, Sir Austin Pearce, drew attention to the fact that the order also represented the 300th sale in the intensely competitive North American market and that the other 200 aircraft had been sold in 31 countries in Europe, the Middle East, South America, Australasia and the Far East. Valuable business is also being done in the retrofit market, with more than forty earlier model HS 125s being fitted with the Series 700's Garrett-AiResearch TFE-731 turbofan engines at service centres in the U.S.A. and Canada.

Twenty aircraft, arranged in suitable formation on a taxiway, included the oldest HS 125 still flying, G-ASNU (c/n. 25005), and XW930 from the Royal Aircraft Establishment, Bedford, which has recently made its first flight fitted with a Laser True Airspeed System (LATAS) jointly developed by the R.A.E. and the Royal Signals and Radar Research Establishment at Malvern.

LATAS

Large and very localised wind changes, sometimes in the form of sudden downdraughts, are known as windshear and fatal accidents have resulted from airliners meeting this condition in take-off and landing situations, developing large sink rates which were not corrected in time. Clearly, prior warning can enable the pilot or automatic flight control system suitably to adjust the aircraft's speed and attitude, and this is the function of the LATAS equipment fitted in the nose of the trials aircraft.

The system involves the use of an invisible CO_2 laser light, shining through the specially coated germanium window in the nose cone, which is focused up to several hundred metres ahead and reflected light from minute particles in the focal region is received back at the aircraft. By measuring the Doppler frequency shift of this reflected light a continuous measurement of airspeed in the focal region is obtained along the line of sight of the equipment. It is hoped that flight trials will provide sufficient information to persuade a British company to propose a programme for the development of a commercially viable system.

Current HS 125 model is the Series 700 which has been sold at a rate of one every ten days since its introduction in 1976, total sales standing at 142 aircraft. A maritime surveillance version, known as Protector, is also being offered, equipped with special search radar, blister windows, etc.

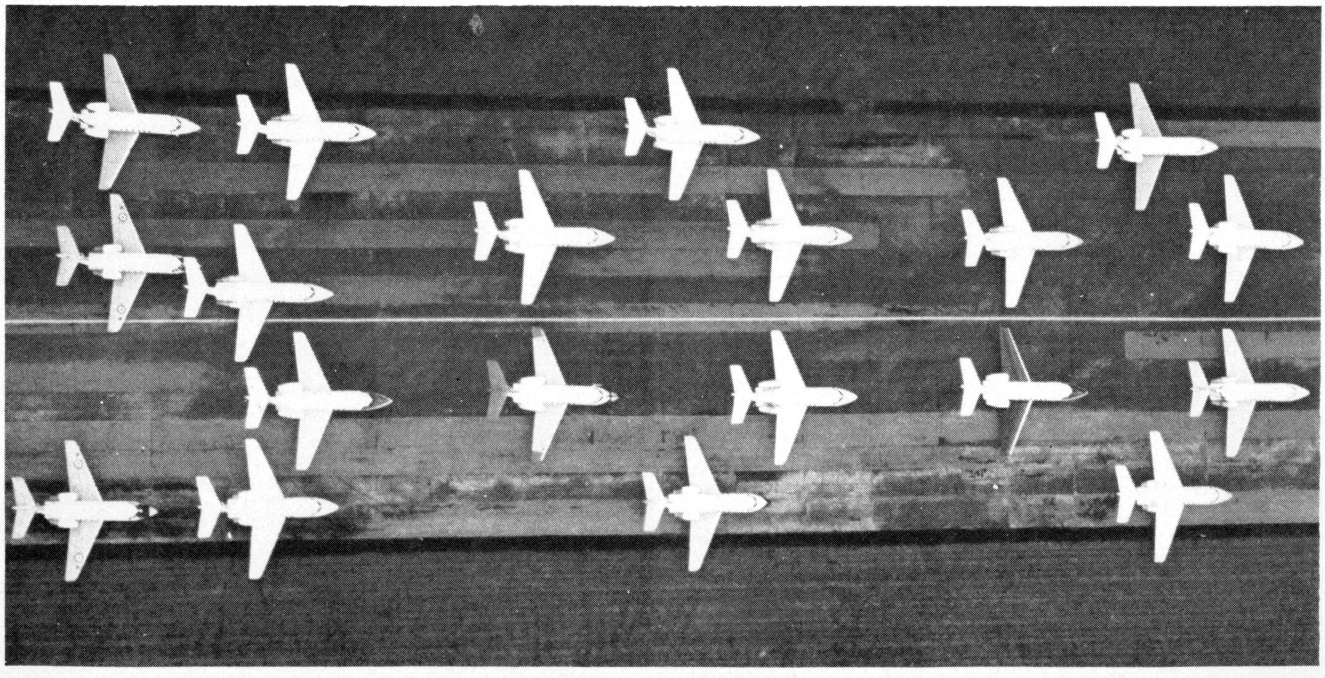
R.A.E. Bedford's HS 125 XW930, trials aircraft for LATAS (note modified nose), at British Aerospace Chester on 29th October (Author's photo)

Aérospatiale helicopter agreements

THE INDONESIAN firm P.T. Nurtanio at Bandung are now assembling, under licence to Aérospatiale, fifteen Puma and Super Puma helicopters which are destined for the Indonesian A.F. and Pelita Air Service.

In Brazil the Helibras company, formed in 1977 by Aérospatiale and local interests, are now assembling the first four SA.315B Lama helicopters at their new Itajuba plant.

Some of the twenty-odd HS 125s and Dominies at Chester on 29th October. Aircraft included G-ASNU, G-AVDX, G-AVPE, G-AZVS, G-BAYT, G-BAZA, G-BAZB, G-BFSO, G-BGGS, G-BHSU, G-BHSW, G-BJCB, G-EFPT, G-HHOI, G-IBIS, XS733, XS736, XW930, D-CMVW and N605W



Your Questions Answered . . .

. . . by AIR-BRITAIN via its over 150 Information Specialists and Aviation Research Groups. Will readers please confine their enquiries to one specific subject, and note that information cannot be supplied separately by post. Unidentified rare photos welcomed for comment.—Ed.

The LTV-Hiller-Ryan XC-142A V/STOL tilt-wing transport first flew on 29th October 1964. Shown here is 62-5924 taking part in the 1967 Paris Air Show

LTV-Hiller-Ryan XC-142A

Q: *Please publish photographs and details of the LTV-Hiller-Ryan XC-142A.—S. Bant, Coventry, Warwicks.*

A: The XC-142A was developed as a tri-Service (U.S.A.F., Navy and Army) V/STOL tactical transport project in the early 1960s. LTV (Ling-Temco-Vought), Hiller Aircraft and the Ryan Aeronautical Co. were joint developers and five aircraft (serials 62-5921 to 62-5925) were built.

The aircraft was of tilt-wing configuration and powered by four 2,850 s.h.p. General Electric T64-GE-1 turboprops, all four being linked by an interconnecting shaft. Dimensions of the XC-142A were: 67 ft. 6 in. span, 58 ft. 1.25 in. length, 26 ft. 1.25 in. height, and 534.4 sq. ft. wing area. Maximum loaded weight was 44,500 lb. (STOL configuration), or 41,100 lb. (VTOL configuration). The design payload was 14,000 lb. (STOL) or 8,000 lb. (VTOL).

The aircraft was planned to carry up to 32 fully-equipped troops in the VTOL configuration over a combat radius of 230 miles, with 10 minutes hovering time at the midway point. It was also intended to be operated from aircraft-carriers in an assault role.

The XC-142A (serial 62-5922) made its first flight with the wing tilted to 10 deg. up on 29th October 1964 at Dallas, Texas. This was followed by the first transition to hovering flight on 11th January 1965. The aircraft's maximum speed proved to be 409 m.p.h. at sea-level and 430 m.p.h. at 20,000 ft., with a typical cruise speed of 288 m.p.h. Ferry range was 2,994 miles and combat radius 230 miles (VTOL) or 345 miles (STOL), with a maximum rate of climb of 6,800 ft./min.

Numerous problems with the aircraft were encountered, and several of the five prototypes crashed during development flying in the years 1965–67. One XC-142A, however, serial 62-5924 put in an appearance at the Paris Air Show in 1967, and the same machine was also used by the National Aeronautics and Space Administration as NASA 522. In 1967 the planned follow-up production programme was abandoned, and in 1970 the sole survivor (62-5924) of the five aircraft was transferred to the U.S.A.F. Museum at Wright-Patterson AFB, Ohio.—*Peter J. Marson, Leader, U.S. Aviation Research Group.*

R.A.F. Geilenkirchen

Q: *Please publish details of R.A.F. use of the airfield at Geilenkirchen.—(Name and address supplied).*

A: Of post-war origin, located in the then British Occupation Zone of Germany, on former national park land some 15 miles north-west of Aachen adjacent to the village of Neuteveren, Geilenkirchen airfield (known locally as *Flugplatz* Teveren) was built by No. 5357 Airfield Construction Wing, R.A.F.

Elements of No. 25 Wing, R.A.F. Regiment, responsible for ground defence, moved in shortly before the Station, administered by No. 83 Group, was opened on 24th May 1953. Initially Geilenkirchen was to be a day-fighter base.

No. 3 Squadron, equipped with Canadair-built Sabres, operated from there during the summer of 1953, being permanently posted in November. Another Sabre unit, No. 234 Squadron, arrived early in January 1954. A third squadron, No. 2 with Gloster Meteors, took up residence during November 1955. In June 1956 both Sabre units converted to Hawker Hunters; the last Sabre was ferried away on the 21st of that month. By July both Hunter F.4 squadrons were operational. Also in June No. 2 Squadron re-equipped with Supermarine Swift FR.5s.

On 15th June 1957 No.3 Squadron disbanded, followed by No. 234 Squadron in July. No. 2 Squadron's Swifts remained as the sole flying unit at Geilenkirchen. By November, however, night ground-attack English Electric Canberra B.2s and B.6s of No. 59 Squadron arrived. In January 1958 No. 2 Squadron transferred to Jever. May of that year also saw a major administrative change as No. 83 Group disbanded, its functions being taken over by No. 2 Group of 2nd Tactical Air Force.

In January 1959 two night-fighter units moved in, No. 256 Squadron with Armstrong Whitworth Meteor NF.11s and No. 96 with Gloster Javelin FAW.4s; almost immediately they were re-numbered Nos. 11 and 3 Squadrons respectively. August saw No. 11 also converting to Javelins.

On 4th January 1961 No. 3 Squadron was disbanded once more but later re-formed by renumbering No. 59 Squadron and taking over the latter's Canberras. From 4th December 1961 until 1st February 1962 No. 29 Squadron was detached to Geilenkirchen from Leuchars. No. 5 Squadron re-formed with Javelins at Geilenkirchen in November 1962 but disbanded in October 1965. English Electric Lightning F.2s of No. 92 Squadron arrived at Geilenkirchen in December 1965 to replace the ageing Javelins of No. 11 Squadron, which was disbanded on 17th January 1966.

R.A.F. Station Geilenkirchen closed in January 1968. During that month No. 3 Squadron (Canberra B(I).8s) moved to Laarbruch, while No. 92 Squadron (Lightning F.2s) transferred to Gütersloh. The station formally ceased flying operations on 26th January 1968 and the airfield was officially handed over to the *Luftwaffe* on 31st March 1968—*Richard P. Bateson, Leader, German Aviation Research Group.*

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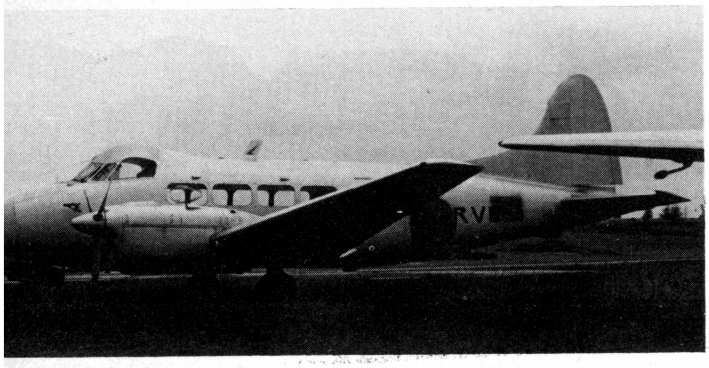
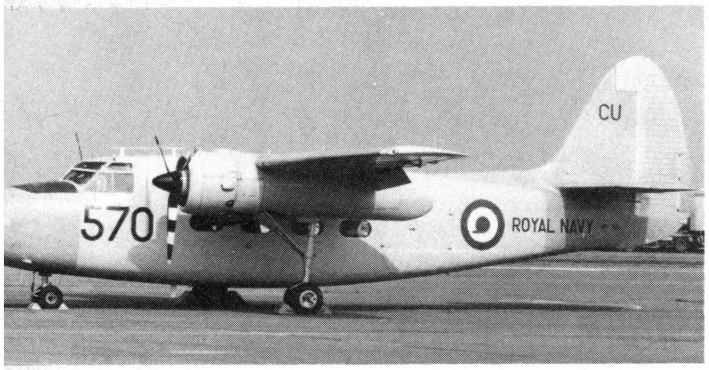
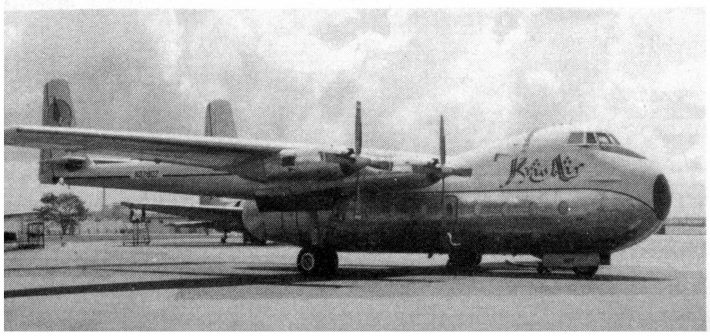






Register Review

by A. J. JACKSON

United Kingdom

Registration	*Type*	*c/n.*	*Previous Identity*	*Remarks*
G-AWGZ	Taylor Monoplane	PFA.1406		Restored to A. Hill, Swindon
G-BHNH	Cessna 404	0672		Northair Aviation Ltd., Yeadon
G-BICP	Robin DR360	610	F-BSPH	I. H. Thompson, Lichfield
G-BICW	Cherokee 161	28-16309	N2091U	Fastraven Ltd., Wingfield
G-BIEG	Cherokee Six 301	32-6028	N81852	Spooner Aviation Ltd.
G-BIEI	Twin Otter 310	720		Bristow Helicopters Ltd., Redhill
G-BIEJ	Sikorsky S-76A	760097		Bristow Helicopters Ltd., Redhill
G-BIEU	AA-5A Cheetah	0754		Cabair Ltd., Elstree
G-BIEV	AA-5A Cheetah	0803	N26906	Cabair Ltd., d/d Gander–Luton–Elstree 1/10
G-BIEZ	King Air F90	LA-111		Eagle Aircraft Services Ltd.
G-BIFB	Cherokee 150	28-1968	4X-AEC	C. J. Reed, Edgware, Mx.
G-BIFC	Colt 14A	064		Colt Balloons Ltd., Edinburgh
G-BIFE	Cessna A185F	04024	N6325E	Northair Aviation Ltd., Yeadon
G-BIFG	Shorts SD3-30	SH.3056		Short Bros. Ltd., Belfast
G-BIFH	Shorts SD3-30	SH.3057		Short Bros. Ltd., Belfast
G-BIFI	Shorts SD3-30	SH.3058		Short Bros. Ltd., Belfast
G-BIFJ	Shorts SD3-30	SH.3059		Short Bros. Ltd., Belfast
G-BIFK	Shorts SD3-30	SH.3060		Short Bros. Ltd., Belfast
G-BIFL	Short Skyvan 3	SH.1974		Short Bros. Ltd., Belfast
G-BIFN	Bensen B-8M	KW.1		K. Willows, Peterborough
G-BIFO	Evans VP-1	10411		P. Raggett, Haslemere, Surrey (amendment)
G-BIFP	Colt 56C	097		J. Philip, Pinner, Mx.
G-BIFT	Cessna F150L	F.0826	PH-CEW	Citation Flying Services Ltd.
G-BIFV	Jodel D150	13	F-BLDH	J. H. Kirkham
G-BIFW	Scruggs BL.2 Wundaballoon	80207		D. Morris, Camberley, Surrey
G-BIFX	Westland Lynx	WA.207		Westland Helicopters Ltd.
G-BIFY	Cessna F150L	F.0829	PH-CEZ	Citation Flying Services Ltd.
G-BIGA	Shorts SD3-30	SH.3061		Short Bros. Ltd., Belfast
G-BIGB	Bell 212	30853	ZS-HHU	British Executive Air Services Ltd., Redhill
G-BIGE	Champion Cloudseeker	AF/CB001		A. Foster, Birmingham
G-BIGF	Thunder AX-7/77 Bolt	295		Thunder Balloons Ltd., London
G-BIGG	Saffery S200	17		A. F. Langhelt, London, SE5
G-BIGL	Cameron 0-65	690		A. H. K. Olpin
G-BIGM	Avenger T200-2112	MM3		M. Murphy, Manchester
G-BIGN	Attic Ser. 1 balloon	001		G. P. Nettleship, London, E11
G-BIGP	Bensen B-8M	RHSC.1		R. H. S. Cooper, Cross Houses
G-BIGR	Avenger T200-2112	004		R. Light, Stockport, Cheshire
G-BIGT	Colt 77A	078		Colt Balloons Ltd., Oswestry

The following out-of-sequence marks have also been allotted:

G-BMON	Boeing 737-2K9	22416		Monarch Airlines Ltd., Luton
G-BOOM	Hawker Hunter T.7	ET274		B. R. Kay, Hemel Hempstead
G-BSDL	TB-10 Tobago	156		Systems Designers Ltd., d/d via Biggin Hill 13/10
G-BXYZ	Commander 690C	11620	N5872K	Glos-Air Ltd., Hurn
G-HOUS	Colt Double Sky Chariot	099		Anglia Balloon School Ltd., Norwich
G-IOSI	Jodel DR1051	526	F-BLRS	R. G. E. Simpson, London
G-MAST	Cherokee Arrow 180	28R-30411	G-AZGM	F. W. Bannister, Brixton
G-OILS	Cessna T210L	60757	G-BCZP	Spectro Oil Analysis Co. Ltd.
G-OKAY	Pitts S-1E Special	12358	N35WH	B. M. O'Brien, Redhill
G-OLEE	Cessna F152	F.1797		Rogers Aviation Ltd., Cranfield
G-ONPN	HS125 Series 1B	25063	G-BAXG	Shirlstar Container Transport Ltd., London
G-PDON	WMB2 Windstreaker	12		P. J. Donnellan
G-RACA	Sea Prince T.1		WN737	Atlantic and Caribbean Aviation Ltd., d/d Kemble–Staverton 11/9
G-RAMS	Lance 301	32R-13134	N82712	Peacock & Archer Ltd., Leek
G-RIND	Cessna 335	0044	N2710L	Westair Flying Services Ltd.
G-RUMN	AA-1A Trainer	0086	N87599	Colton Aviation Ltd., Elstree
G-RUSS	Cessna 172N	68563	N733UR	R. D. Bartlett, t/a Leisure Lease
G-SATO	Aztec 250	27-54045	G-BCXP	Colt Car Co. Ltd., d/d Leavesden–Staverton 23/6
G-SKYM	Cessna F337E	F.0019	G-AYHW	A. P. Mathew and B. J. Ixer, t/a Stapley & Co.
G-SWAT	Currie Super Wot	PFA.3011		A. C. Walker
G-TOUR	Robin Alpha 2000	187		F. J. Franklin, Booker
G-TRIX	Spitfire Mk.IX	PV202	Irish 161	S. Atkins
G-TTWO	Colt 56A	087		D. M. Winder, Coventry

Arrow Sport G-AARO fully rigged for static exhibition at the Biggin Hill B. of B. Display 21/9 (Don Conway); Irish Air Corps Devons 201/G-ARSN and "G-ARVE" (a VC10 registration) believed ex 194, have been ferried to Exeter for civilianisation (Keith Saunders); Sea Prince WP321/G-BRFC during a recent visit to Southend (Simon Murdoch); Nantes Aviation's 1967 swept fin Riley Dove F-BGOA at Yeadon 14/10 while en route to Lulsgate (Colin Addison); the former Riddle Argosy N37807 "Sir Stamford Raffles" ready for service with Kris Air at Singapore 8/80 (Keith Sissons)

G-TWEL	Cherokee 161	28-90290	N81963	T.W. (Electrical) Gretton Ltd., Corby, Northants.
G-UCPA	PIK 20E	20-265		B. J. Wilson, c/o Cathay Pacific Airways, Hong Kong
G-UESS	Citation 500	0326	N452C	Osiwell Ltd.
G-UIDE	Jodel D120	262	F-BMIY	B. T. Gilbert
G-VALE	AT-6C Harvard IIA	88-10677	G-RBAC	Kayvale Finance Ltd.
G-VIKE	Bellanca 1730A Viking	30911	N302CB	M.L.P. Aviation Ltd., Elstree
G-VWSE	Cessna 404	0458		Northair Aviation Ltd., Yeadon
G-XING	Embraer 121A Xingu	030		C.S.E. Aviation Ltd., Oxford
G-ZERO	AA-5B Tiger	0051	OO-PEC	Cabair Ltd., Elstree

Republic of Ireland

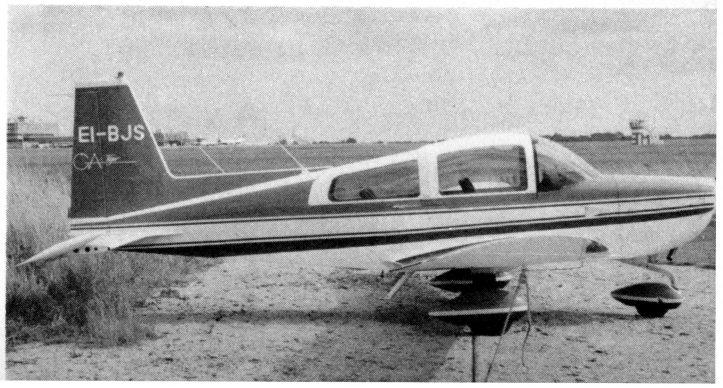
EI-BIS	Robin R1180TD Aiglon	268		Bruton Aircraft Engineering Ltd., Abbeyshrule
EI-BIU	Robin R2112A Alpha	175		
EI-BIV	Bellanca 8KCAD Super Decathlon	46479	N5032Q	Aerocrats Flying Group Ltd., Dublin
EI-BJB	Aeronca 7AC	925	N82296	Huntley and Huntley Ltd., Weston and J. Rogers, Dublin
EI-BJD	Mooney Mk.20K	25-0389		Elam Corp. Ltd., Abbeyshrule
EI-BJE	Boeing 737-275	19742	C-FPWD	Air Tara Ltd., Lagos
EI-BJF	AA-5 Traveler	0568	F-BVRM	B. O'Shea, Weston
EI-BJG	Robin R1180			Reserved for H. Hanley
EI-BJH	Slingsby Nipper 3	S.104	G-AVKK	B. A. Carpenter, Shannon
EI-BJI	Cessna FR172E	F.0040	G-BAAS	Irish Parachute Club, Edenderry
EI-BJJ	Aeronca 15AC	226	N1214H	Huntley and Huntley Ltd., Shannon
EI-BJK	Rallye 110ST	3226	F-GBKY	Barton Ltd., Powerscourt
EI-BJL	Citation 550	0039	G-BJHH	Helicopter Maintenance Ltd., Castlebar
EI-BJM	Cessna 152	0936	N761CC	Iona National Airways Ltd.
EI-BJN	Citation 501	0175		Tool & Mould Steel (Ireland) Ltd., Cologne
EI-BJO	Cessna R172K	3340	N758TD	Matthew Masterson, Dublin
EI-BJP	Boeing 737-275C	19743	C-FPWE	Air Tara Ltd., Lagos
EI-BJR	Bell 206B Jet Ranger	587	G-AYMW	Irish Helicopters Ltd.
EI-BJS	AA-5B Tiger	0979	G-BFZR	A. Killian and C. Pearce, Dublin
EI-BJT	PA-38 Tomahawk			Reserved for B. A. Carpenter, Shannon
EI-BJU	Commander 690B	11546		Reserved for Flightline Ltd.
EI-BKA	Pitts S-2A Special	2165	N105JM	Arthur Wignall, Dublin

REGISTRATIONS CANCELLED

Registration	*Type*	*Identity*	*Reason*
G-ATET	Twin Comanche	30-770	Sold in the United States
G-ATXY	WHE Airbuggy	M4/4 No. 1	Withdrawn from use
G-BBEE	Learjet 25B	135	Sold in the United States
G-BBIS	Hughes 269C	0219	Sold in South Africa
G-BCIC	Wilga 35	74210	Crashed near Booker 29/6
G-BCLN	Sikorsky S-58ET	58-1539	Sold in the Lebanon
G-BEPN	Pawnee 235	25-56022	Beyond repair in take-off accident, Aldsworth, Glos. 11/2/78
G-BFNA	Pawnee 235	25-56014	Sold in Zaire
G-BHBU	Westland Sioux	XT170	Sold in Spain
G-BHDL	Bell 212	30544	Re-registered in Bermuda
G-BHNI	Cessna 404	0644	Sold in the United States
G-BHVK	Short Skyvan 3	SH.1973	Sold in Malawi

PRODUCTION LINE

...AA-5 Traveler (0423) OY-GAD, f/f at Castle Donington 22/8 as G-BIAY
...AA-5A Cheetah: N26836 and N4556D, d/d Gander–Luton–Elstree 6/10 and 23/10
...Bandeirante (294) G-HGGS, d/d to Euroair Ltd., Biggin Hill 10/10
...Baron 58 (TH-1191) G-JADE, d/d Shannon–Luton–Leavesden 2/10
...Boeing 737 (21806) G-BGDS, d/d to British Airways, Heathrow 27/9; (22030) G-BGJI, d/d to British Airtours, Gatwick 2/10; (22415) G-DFUB, d/d Goose Bay–Luton 1/10 for Monarch Airlines
...Boeing 747 (21831) G-BDXJ, named "City of Birmingham" at Elmdon 10/10; (22306) G-KILO, d/d to British Airways, Heathrow 1/10
...Cessna F172M (F.1108 and F.0932) OY-BFR and 'DZH, f/f at Castle Donington 21/8 as G-BHYP and G-BHYR respectively
...Cessna 210: N732TX and N6581B, d/d Reykjavik–Luton–Elstree 7/10
...Commodore 235 (13323) G-BIAC, d/d to Biggin Hill 23/10
...Dakota 3: N54607 d/d Reykjavik–Luton–Blackbushe 8/10
...DC-10-30 (47840) G-BHDJ, d/d to British Caledonian at Gatwick 18/10
...HS125 Series 700 (257076) 7Q-YJI; ('079/NA0268) XA-JIX; ('082) Irish Air Corps 238, d/d Luton–Casement 13/2/80; ('087/NA0262) C-GKRS, d/d to Kaiser Resources via Keflavik 11/2; ('091) G-BHLF, d/d to Marconi, Luton 11/4; ('093/'266) G-BHMP, d/d to Humana Inc., Canada via Keflavik 9/4; ('097) G-HHOI, d/d to Trust House Forte, Heathrow 4/7; ('099/'270) G-BHSK, d/d to BAe/N. America via Keflavik 3/6; ('105/'0274) N10PW, d/d to Penwalt Corp. via Keflavik 14/7; ('107) G-BHSV, d/d to Shell Aircraft, Heathrow 1/10
...Fairchild FH-227B (536) G-SKYA, d/d to Southend 16/10; (539) G-SKYB, to Southend 16/10, rolled out 17/10 as PT-LBG for TABA
...Gemini 1A (6519) G-AKHP, d/d to Biggin Hill 15/10 for Philip Mann
...King Air F90 (LA-80) G-BHUS, d/d Reykjavik–Luton–Leavesden 13/10
...Sea Prince (WF133) G-BIDN, d/d Kemble–Staverton 3/10
...Super Cub (18-8057) G-LION, d/d Deventer–Southend–Humberside 1/10
...Tampico (149) G-BIBA, d/d to Biggin Hill 13/10; (145) G-GMSI, on 23/10
...Trislander (1038) G-BEDO, dismantled at Bembridge 7/80; (1059) G-BEVV, f/f 2/6, to UK 13/6
...TriStar 200 (1193) G-BHBL, d/d to British Airways, Heathrow 30/9
...Twin Pioneers (538) G-AYFA, (577) G-AZHJ, (558) G-BBVF and (561) G-BCWF have moved from Staverton to Shobden with Flight One Ltd.; (512) G-BDLX, scrapped at Staverton 9/80



Beech Duchess EI-BHS at Shannon 22/6 after transatlantic delivery (David O'Mahony); P. von Lonkhuyzen's Zlin 526 EI-BIG, formerly D-EBUP, and Bruton Aircraft's Robin Aiglon EI-BIS at Abbeyshrule 25/5; Bellanca Super Decathlon N5032Q of the Aerocrats Flying Group, Dublin, with hastily daubed Irish registration EI-BIV; also Dublin-based is the AA-5B Tiger EI-BJS, formerly Gilbert O'Sullivan's G-BFZR (all photos Paul Cunniffe)

Left: *McCain Food's I.A.I. Westwind 1124 C-GRDP, c/n. 188, at Leeds and Bradford on 19/10. Arriving from Reykjavik, it departed for Luton on 22/10.* Right: *Another Canadian visitor to Leeds and Bradford during October was this Gulfstream II C-FFNM, c/n. 52, of Falconbridge Nickel Mines, which nightstopped 1/10 while en route from Luton to Dusseldorf (both Colin Addison)*

Airport Movements

Inverness/Dalcross

28/9	OE-FFW	Beech B.60 Duke, c/n. P-65, Linz Air Taxis, Luton–Keflavik
1/10	N90DM	Falcon 10, c/n. 104, Sales International, from Glasgow
7/10	SE-DEM	Learjet 35A, c/n. 317, Baltic Aviation, from Casablanca

Glasgow

29/9	F-BFDG	Falcon 10, c/n. 61, Euralair, with F-BYCC, c/n. 76
	YR-BCG	One-Eleven 401AK, c/n. 77, ex N5035, Tarom; YR-BCD 2/10
4/10	N1871P	Learjet 36A, c/n. 23; F-GCPS FH-227B, ex N4226, TAT
7/10	N801EV	DC-8-52, c/n. 45750, ex ZK-NZA, Evergreen International
9/10	C-FCSC	Twin Otter, C-FCSF on 19/10; YV314P Cessna 421 on 15/10

Prestwick

29/9	N922CR	Westwind 1124, delivery; N500M 23/10 and N500GK on 27/10
2/10	A58	Alpha Jet, returning from a demonstration tour of training bases in the U.S.A. In company with Falcon 20F F-GBTM
3/10	N1CC	Boeing 727-21, c/n. 18998, Luqa Inc., at Heathrow on 16/10
7/10	LV-PIJ	I.A.I. Arava, and 10/10 G-HGGS Bandeirante, both on delivery
22/10	N88AE	Gulfstream II, c/n. 102, National Express Inc., New York

Teesside

30/9	SE-GEO	Beech 99, c/n. U-14, Aero Center, from and to Stavanger
1/10	LN-MAR	Cessna 404, c/n. 48, Norving; LN-SAR Navajo, Nordsjofly
3/10	EC-CTT	DC-9-34F, c/n. 47704, Aviaco; LN-PAJ Beech A.100 on 8/10
23/10	I-CHOC	Falcon 10, c/n. 113, VIP-Air; XS737 Dominie T.1 on 24/6

Newcastle

4/10	YU-AKD	Boeing 727-200, c/n. 21040, J.A.T., from and to Pula
8/10	CF-CPP	DC-8-63, CP Air, to Toronto, last flight of the season
22/10	SE-DEA	Learjet 35, c/n. 51, Business Air, Torp to Heathrow
27/10	130316	C-130H Hercules, Canadian Armed Forces, Lahr-Gatwick
28/10	141009	Convair C-131F, U.S. Navy, from Mildenhall to Prestwick
	M-1	Alouette, Belgian Navy, c/s. OT-ZPA, from ship in Tyne

Leeds and Bradford

1/10	PH-RVU	Partenavia P.68B, Dutch Police; OY-PRY of Sun-Air on 7/10
8/10	N8062H	Cessna F.182RG, c/n. 46, Cessna Corp., at Southend 10/10
15/10	SE-DEL	Falcon 10, c/n. 14, Saab-Scania; PH-IET PA-44 Seminole

Manchester International

25/9	130323	CC-130E, Canadian Armed Forces, '322 27/9 and '320 on 29/9
26/9	N365G	Gulfstream IITT, c/n. 198; C-GSLK, c/n. 46, on 28/9
	TF-BCV	DC-8-63, c/n. 46002, Cargolux, from Luxembourg to Shannon
28/9	HB-LLA	Metroliner, c/n. TC-291, from Brussels with Air Florida crew
2/10	N328VP	Convair 580, c/n. 18, The Way International, Dublin diversion. This aircraft also visited Inverness/Dalcross on 6/10
31/10	VP-WGB	Viscount 839, Air Zimbabwe, test flight, ex G-BGLC, d/d 2/11

East Midlands

27/9	DM-SCL	Tu-134A, Interflug, with DM-SCP; LZ-TUF of Balkan on 29/9
28/9	G-AWNJ	Boeing 747-136, also G-AWNP and G-BDPV, fog diversions

Birmingham

16/9	F-BTSC	Concorde 101, Air France, from and to Charles de Gaulle
20/9	N523AC	One-Eleven 203, c/n. 015, ex G-ASUF, Amway Corporation
30/9	I-FLYA	Citation I, c/n. 501-0099, Eurofly Service, from Rome
3/10	N809LS	Gulfstream II, c/n. 47, Lear Siegler, from Lisbon
13/10	F-GCMS	Learjet 35A, c/n. 257, Air Pamys, from and to Paris
16/10	D-CBVW	NA-265-80 Sabreliner, Volkswagen, from Sylt to Zurich
	F-GAPC	Falcon 20C, c/n. 184 and F-GAPY Learjet 23, c/n. 027
17/10	OE-ILB	Friendship, Air Lauda, from Salzburg; N4422P PA-27 Aztec

Norwich

13/10	LN-PAH	Cessna 404, Partnair; also LN-VIN of Helikopter Service
16/10	G-APWH	Dart Herald, Air UK, arrived for storage, G-ASKK on 31/10
29/10	G-BDAS	One-Eleven 518FG, Dan Air, to Cognac; LX-HBR Aztec 31/10
24/10	G-APEG	Merchantman, Air Bridge Carriers, cattle flight to Holland

Luton

1/10	D-AMAT	One-Eleven 524FF, Munich–Lasham; LN-FOI Electra on 3/10
11/10	N98KR	JetStar 6, c/n. 5048, left on 12/10 repainted as N98MD
13/10	G-AVFI	Trident 2, to Rumania with the England football team
14/10	9Q-CDT	Britannia 253F, Katale Air Transport, for maintenance
18/10	N8527A	Boeing 737-2A6, c/n. 20194, ex VR-BEH, d/d to Bangor

Northolt

27/9	CF-02	Merlin IIIA, Belgian Air Force; '05 10/10 and '01 17/10
1/10	12431	CH-124 Sea King, Canadian Armed Forces, with 12436
	K-687	C-47 Dakota, Danish Air Force, K-683 and K-684 on 5/10
6/10	XL929	Pembroke C.1, delivery to 60 Squadron. Formerly in store
15/10	22671	UH-1H Iroquois, U.S. Army, with 17405; 85+12 CH-53 16/10

London/Heathrow

21/9	N9WP	One-Eleven 401AK, c/n. 078, ex N5036, Walter Probst Inc.
22/9	N700PM	Gulfstream IITT, c/n. 207, Philip Morris Inc., New York
24/9	HZ-AHP	TriStar 200, Saudia, delivery; PH-ILR Falcon 50 on 25/9
25/9	9K-AFA	Boeing 727-269, Kuwait Airways, delivery; 'FB on 11/10
26/9	5R-MFT	Boeing 747-2B2B, c/n. 21614, Air Madagascar, diversion
30/9	F-GDCP	Learjet 35A; D-CBPD Learjet 25B, c/n. 091, on 6/10
3/10	N631SC	Gulfstream IITT, c/n. 224, Stauffer Chemical Company
5/10	HB-INC	DC-9-81, c/n. 48002, Swissair, first Super 80 service
16/10	LX-ECV	Boeing 747-132F, Cargolux, on Malaysian Airlines flight

London/Gatwick

3/10	F-GCGQ	Boeing 727-227, c/n. 20609, ex N411BN, Europe Aero Service
10/10	HZ-NB2	One-Eleven 401, c/n. 64, ex N5024, National Commercial Bank
18/10	G-GFAL	DC-10-10, Laker, left on lease to Malaysian Airlines for the Moslem "Hadj" pilgrimage flights to Mecca
21/10	4X-ACF	Boeing 747-258C, c/n. 21594, El Al charter from Tel Aviv
23/10	N603BN	Boeing 747SP-27, c/n. 21785, Braniff International

Stansted

1/10	N112WA	DC-10-30CF, World Airways, diversion from Gatwick
2/10	N1PB	Falcon 10, c/n. 92; N85JM, c/n. 85, of Murphy Oil 5/10
11/10	N728GM	Gulfstream I; N6109X Cessna 310-II visited on 25/10
21/10	TR-LVK	DC-8-55F, c/n. 45805, Air Gabon, at Heathrow on 26/9

Southend

4/10	N4662W	Rockwell 112; N231RH Mooney M.20 19/10; N9RV Cessna 310 21/10
6/10	F-BRNL	Learjet 24B, c/n. 183; PH-ILF Falcon 20C, c/n. 147, 14/10
18/10	5S-TB	Skyvan, c/n. SH.1860, Austrian Air Force, from Lyneham
20/10	I-ELET	Navajo, from and to Strasbourg; SE-IEH King Air 200 22/10

Manston

26/9	G-BHVT	Boeing 727-212, ex 9V-SGC, Dan Air, Gatwick diversion
30/9	63-8475	EC-135F, French Air Force, c/s. F-UKCF; 12735/F-UKCG 15/10
1/10	HL7431	Boeing 707-373C, Korean Airlines; HL7425 visited 10/10
14/10	CH-07	C-130H Hercules, 20 Squadron, Belgian Air Force

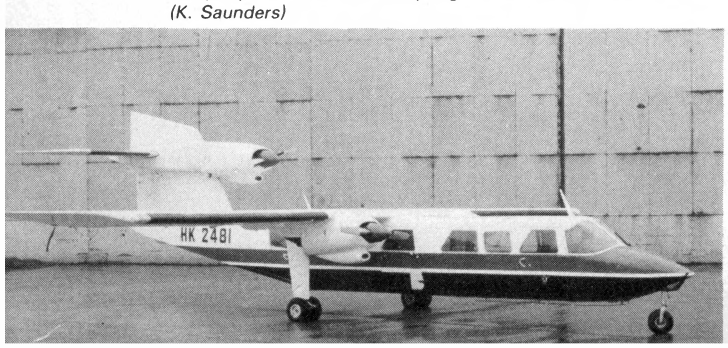
Biggin Hill

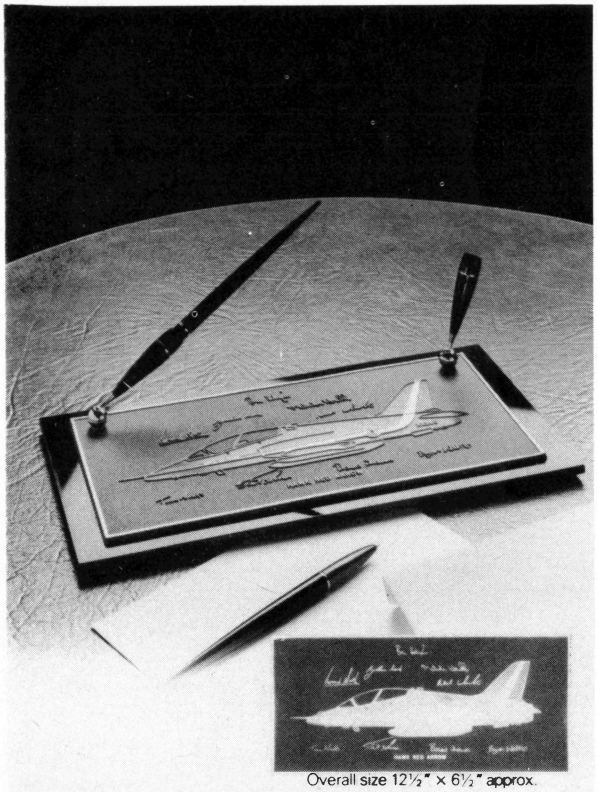
5/10	N9040V	Beech B.60 Duke, Madrid–Silverstone; N8198V Cherokee 15/10
14/10	5N-AMP	PA-31 Navajo, left on delivery to Nigeria; G-BICF GA-7 19/10
21/10	I-IEAA	Partenavia P.68B Victor, c/n. 87, Italian Aero Club, Rome

Gloucester/Cheltenham (Staverton)

30/9	F-GCJN	King Air E.90, c/n. LW-335, Transair, from and to Lille
5/10	D-IKKD	PA-34 Seneca 200T, Dortmund–Cork; N11824 Cessna 150 12/10
9/10	I-NCCA	Cessna 414A, c/n. 0282, Soc. Nardi, from Liverpool, to Milan 10/10. It flew Frankfurt–Birmingham–Liverpool 7/10
19/10	N71AF	Aero Commander 680W, from Birmingham to Ronaldsway, I.O.M.

Left: *The former Loganair Trislander G-AZZM at Glasgow on 27/10 prior to departure on its delivery flight to Tavina of Colombia as HK2481 (G. McLaughlin).* Right: *Andrews Air Force Base based VC-131G 145962 of the U.S. Marine Corps visited Exeter on 7/10, in company with the U.S. Navy Signorella based C-131F 141001, in connection with the U.S. Navy's Sixth Fleet Band concert in Torbay (K. Saunders)*





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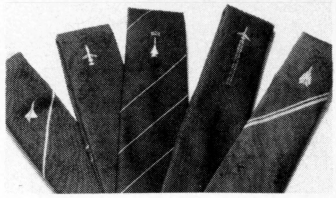

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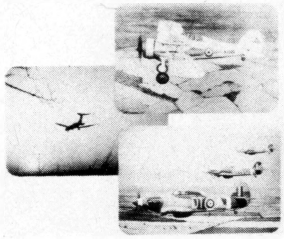

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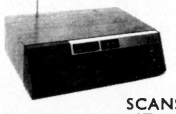

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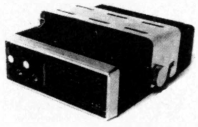

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Kit News
by J. D. R. RAWLINGS

Airfix releases

FOREMOST AMONG the recent Airfix releases is a 1/48th-scale kit of the Hawker Fury I, the company having now branched out in this scale into the delightful area of inter-war biplane fighters. The Fury was one of the prettiest of these and Airfix have captured it well with a model that is extremely accurate in shape and line. Surface detailing is good also.

Assembly is simple and as the centre-section struts have been moulded as one piece, buried beneath the cockpit coaming when installed, the usual problem of getting the top wing aligned correctly is easily overcome. The kit contains forty-eight parts of which eight comprise the engine and propeller and six the cockpit details. Particularly noteworthy is the method of obtaining the open exhausts, which look most realistic. A fine transfer sheet provides for the C.O.'s aircraft of No. 43 Squadron or the leader of No. 1 Squadron's aerobatic team.

New in 1/72nd scale—still the staple diet of most model makers—are the McDonnell F2H Banshee and Dassault-Breguet/Dornier Alpha Jet. The former kit is welcome as it represents a period that is all too scantily covered in the kit ranges—the early jets. The Banshee is moulded in midnight blue, the overall colour of the completed aircraft, and provides alternatives with different noses, one for an F2H-2P, the other a straight F2H-2. The kit is well up to Airfix's normal standard for accuracy and goes together with little or no trouble. As well as the alternative noses, there is a good range of underwing bombs and rockets for the four hard points, plus a transfer sheet for two aircraft that operated in the Korean War in 1951: a Marines Corps F2H-2P and the straight F2H-2 from VF-172 on the U.S.S. *Essex*.

The Alpha Jet kit, with sixty-five parts moulded in medium grey, again enables two different versions to be built: a trainer as used by the *Force Aérienne Belge* at Brustem, or a ground-attack aircraft of the *Luftwaffe*'s *Jabo G 49* at Fürstenfeldbruck. The kit is designed around an easy method of installing the aircraft's undercarriage which is assembled and then embedded in the cockpit floor. This, together with the cockpit "bath", is then mated to the two cockpit sides to make an accurate fit. From then on the other pieces fall into place neatly, with alternative noses and underwing tanks or underwing and fuselage weaponry for the German machine. The whole, when painted and transfers applied, makes a very lifelike representation.

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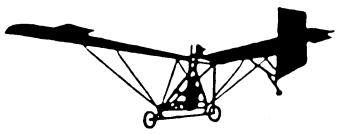

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